PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XL—No. 6

AUGUST, 1914

Edited by the Secretary, under the direction of the Committee on Publications.

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NEW YORK 1914

American Society of Civil Engineers

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Term expires January, 1916:
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ON CONCRETE AND REINFORCED CONCRETE: Joseph R. Worcester, J. E. Greiner, W. K. Hatt, Olaf Hoff, Richard L. Humphrey, Robert W. Lesley, Emil Swensson, A. N. Talbot.

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ON STEEL COLUMNS AND STRUTS: Austin L. Bowman, James H. Edwards, Charles F. Loweth, Rudolph P. Miller, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard, George W. Tillson, Nelson P. Lewis, Charles J. Tilden.

ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, Charles S. Churchill, Leonard Metcalf, William G. Raymond, Henry E. Riggs, Jonathan P. Snow, William J. Wilgus.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensel.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edward C. Shankland, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas, Samuel T. Wagner, Frank M. Kerr.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensel, T. G. Dabney, C. E. Grunsky, Frank M. Kerr, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellew.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, C. G. E. Larsson, William McNab, G. J. Ray, F. E. Turneaure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.
CABLE ADDRESS.....“Ceas, New York.”

*Elected to fill the vacancy caused by the death of Emil Gerber, Director, on April 16th, 1914.

Vol. XL. AUGUST, 1914. No. 6.

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

SOCIETY AFFAIRS

CONTENTS

MINUTES OF MEETINGS OF THE SOCIETY

May 20th, 1914.—The meeting was called to order at 8.30 P. M.; Director T. Kennard Thomson in the chair; Charles Warren Hunt, Secretary; and present, also, 138 members and 20 guests.

The Secretary presented a paper by W. C. Hammatt, M. Am. Soc. C. E., entitled "California Practice in Highway Construction."

A paper by Harrison S. Taft, Esq., entitled "Reinforced Concrete Docks: Foreign and American Structures; Failures, Costs, and General Considerations," was presented by the Secretary, who also read a communication on the subject from E. L. Corthell, M. Am. Soc. C. E. The paper was discussed orally by Messrs. J. H. H. Muirhead,

W. J. Barney, E. W. Stern, O. E. Mogensen, R. D. Coombs, J. J. Pemoff, and William Goldsmith.

A paper by H. Hawgood, M. Am. Soc. C. E., entitled "Huacal Dam, Sonora, Mexico," was presented by the Secretary, who also read a communication on the subject from L. J. Mensch, M. Am. Soc. C. E.

The Secretary announced the following deaths:

CHARLES FRANCIS, of Davenport, Iowa, elected Member, May 4th, 1892; died April 29th, 1914.

NATHANIEL TURNER, of Monterey, N. L., Mexico, elected Member, March 6th, 1895; died January 19th, 1914.

CLAUDE SANFORD HAYNES, of Brooklyn, N. Y., elected Associate Member, January 4th, 1910; died May 5th, 1914.

Adjourned.

FORTY-SIXTH ANNUAL CONVENTION, HELD IN BALTIMORE, MD., JUNE 2D-5TH, 1914

FIRST SESSION*

Tuesday, June 2d, 1914.—The first session of the Convention was opened in the Hotel Belvedere at 10 A. M.; Francis Lee Stuart, M. Am. Soc. C. E., Chairman of the Local Committee of Arrangements, in the chair; Chas. Warren Hunt, Secretary; and present, also, about 350 members and guests. Mr. Stuart introduced the Hon. James H. Preston, Mayor of Baltimore, who addressed the meeting and welcomed the members to the city. Hunter McDonald, President, Am. Soc. C. E., replied on behalf of the Society, and then delivered the Annual Address.†

Adjourned.

SECOND SESSION—BUSINESS MEETING‡

Tuesday, June 2d, 1914.—The meeting was called to order at 8.30 P. M.; President Hunter McDonald in the chair; Chas. Warren Hunt, Secretary; and present, also, about 200 members and a number of guests.

The following proposed Code of Ethics was submitted, with the recommendation of the Board of Direction that it be adopted by the Society:

"CODE OF ETHICS.

"It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of the American Society of Civil Engineers:

"1. To act for his clients in professional matters otherwise than as a faithful agent or trustee, or to accept any remuneration other than his stated charges for services rendered his clients.

"2. To attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects, or business, of another Engineer.

"3. To attempt to supplant another Engineer after definite steps have been taken toward his employment.

"4. To compete with another Engineer for employment on the basis of professional charges, by reducing his usual charges and in this manner attempting to underbid after being informed of the charges named by another.

"5. To review the work of another Engineer for the same client, except with the knowledge or consent of such Engineer, or unless the connection of such Engineer with the work has been terminated.

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* The report in full of this meeting begins on page 368.

† See page 1815 of Papers and Discussions.

‡ For the Report in Full of the Business Meeting, see page 372.

"6. To advertise in self-laudatory language, or in any other manner derogatory to the dignity of the Profession."

The Secretary presented letters relating to the proposed Code of Ethics from Messrs. Charles H. Ledlie, L. D. Ricketts, Edgar Marburg, J. B. Berry, Massena L. Culley, Granville W. Shaw, Louis L. Tribus, P. E. Stevens, Howard S. Reed, and others.

On motion, duly seconded, the meeting approved of the proposed Code, and ordered that the question of its adoption be submitted to the membership by letter-ballot.

A motion, duly seconded, to the effect that it is the sense of this meeting that, in future, all suggestions for nominees on the Nominating Committee be secret, was lost.

The Secretary presented a report* of the results, to date, of a canvass of the replies received relative to the use of thin paper in *Proceedings* and *Transactions*.

The Secretary announced the following appointments by the Board of Direction:

Robert A. Cummings, M. Am. Soc. C. E., on the Board of Direction, to fill the vacancy caused by the death of Emil Gerber, Director, Am. Soc. C. E.

Rudolph P. Miller, M. Am. Soc. C. E., on the Special Committee on Steel Columns and Struts, to fill the vacancy caused by the death of Mr. Gerber.

C. G. E. Larsson, M. Am. Soc. C. E., on the Special Committee to Report on Stresses in Railroad Track, to fill the vacancy caused by the death of Mr. Gerber.

Nelson P. Lewis, M. Am. Soc. C. E., on the Special Committee to Investigate Conditions of Employment of, and Compensation of, Civil Engineers, to fill the vacancy caused by the death of Alfred Noble, Past-President, Am. Soc. C. E.

Charles S. Churchill, William J. Wilgus, and Henry E. Riggs, Members, Am. Soc. C. E., on the Special Committee on Valuation of Public Utilities. (Messrs. Alfred Noble and Thomas H. Johnson, now deceased, were members of this committee.)

The Secretary also announced the retirement of H. M. Byllesby, M. Am. Soc. C. E., as a member of the Special Committee on Valuation of Public Utilities.

The Secretary announced the appointment of William L. Saunders and Chas. Warren Hunt, Members, Am. Soc. C. E., as members of the Reception Committee, from the American Society of Civil Engineers, to receive Foreign Engineers attending the International Engineering Congress in San Francisco in September, 1915.

* See page 394.

The Secretary announced the following deaths:

JAMES JOSEPH FERRIS, of Jersey City, N. J., elected Associate, July 10th, 1907; Member, September 3d, 1912; died May 15th, 1914.

RALPH ALBREE, of Pittsburgh, Pa., elected Junior, October 4th, 1898; Associate Member, October 1st, 1902; died February 16th, 1914.

HORACE ARTHUR COOK, of Phœnix, Ariz., elected Associate Member, May 3d, 1910; died May 17th, 1914.

C. McD. Townsend, M. Am. Soc. C. E., Chairman of the Special Committee on Flood Prevention, presented a Progress Report* of that Committee.

Adjourned.

THIRD SESSION

Thursday, June 4th, 1914.—The meeting was called to order at 10 A. M.; President Hunter McDonald in the chair; Chas. Warren Hunt, Secretary; and present, also, about 250 members and guests.

W. A. Cattell, M. Am. Soc. C. E., addressed the meeting on the subject of the International Engineering Congress to be held at the Panama-Pacific Exposition in 1915.

The meeting was addressed by R. Keith Compton, M. Am. Soc. C. E., Chief Engineer, Paving Commission, Maj. Joseph W. Shirley, Chief Engineer, Topographical Survey, F. W. McKinney, Assoc. M. Am. Soc. C. E., Chief Engineer, Commission for Opening of Streets, O. F. Lackey, M. Am. Soc. C. E., Chief Engineer, Harbor Board, Calvin W. Hendrick, M. Am. Soc. C. E., Chief Engineer, Sewerage Commission, and E. B. Whitman, M. Am. Soc. C. E., Consulting Engineer and President of the Water Board, who described briefly the engineering features of the various works to be inspected in the afternoon.

Adjourned.

ELECTIONS AND TRANSFERS BY THE BOARD OF DIRECTION, JUNE 24TH, 1914.

ELECTED AS MEMBERS

JAMES PARKER BROWNELL, Carthage, N. Y.
WILLIAM GEORGE COMBER, Paraiso, Canal Zone, Panama
HARRY COOPER CORNS, Cypress, Ind.
CHARLES ELMER CROWNOVER, Meadow Creek, Wash.
OLIVER DEAN DALES, Niagara Falls, N. Y.
FLOYD WILLIS FREDERICK, Chicago, Ill.
CHARLES FRAZINE HAMILTON, Franklin, Pa.
DAVID LOEWENSOHN, Kent, Ohio

* See page 397.

George John Lyon, Schenectady, N. Y.
James Daniel Mortimer, New York City
George Frederick Palmer, St. John, N. B., Canada
Josiah Fowler Pinson, Seattle, Wash.
Henry Budd Reed, New York City
Francis Raber Schanck, Los Angeles, Cal.
William Albert Stinchcomb, Cleveland, Ohio
Raleigh Colston Thomas, Baltimore, Md.
John Ralph Van Duyne, Newark, N. J.
James Goold Warren, Buffalo, N. Y.
Dalton Russell Wells, Detroit, Mich.
Marshall Williams, Pittsburgh, Pa.
Irving Worthington, Fresno, Cal.

Elected as Associate Members

Carlton Allen, Louisville, Ky.
Covington Kennedy Allen, Baltimore, Md.
Edward Lee Bandy, Long Key, Fla.
Reginald Gillon Christophers, Stratford, New Zealand
Jerry Collins, New York City
Carlton Nudd Conner, Wheeling, W. Va.
Orrin Fulton Cooley, Los Angeles, Cal.
Herman François Doeleman, Baltimore, Md.
Vernon Milton Eager, South Bend, Wash.
James McCardell Fourmy, Chattanooga, Tenn.
David Edward Henry, Manila, Philippine Islands
Louis Thomas Franklin Hickey, San Francisco, Cal.
William Andrew Hill, Boston, Mass.
Ray Kingsbury Holland, Ann Arbor, Mich.
Charles Archer Hopkins, Lewiston, Mont.
Hollis Douglass Immich, Meriden, Conn.
Walter Edward Joyce, Montreal, Que., Canada
Walter Ward Kane, Newark, N. J.
Walter John Kingscott, Bear Lake, Mich.
Edward Philip Lacey, Bradentown, Fla.
John Harold Lane, San Francisco, Cal.
Thomas Maddock, Williams, Ariz.
Edward Gilbert Mathews, Brooklyn, N. Y.
Herbert Ledlie Michael, Buffalo, N. Y.
Gonzalo Claudio Muñoz, Los Angeles, Cal.
Alois John Joseph Pfeiffer, London, England
Richard Alexander Pratt, Chicago, Ill.
Louis Rabinowitz, New York City
Elihu Harrison Ropes, Washington, D. C.
Frank Watkins Sampson, Dallas, Tex.

Ernest Eugene Schenk, Waterloo, Iowa
Willis Appleford Slater, Urbana, Ill.
Francisco José de Sola, Havana, Cuba
William Wentworth Stevens, Shanghai, China
Leslie Wrightson Stocker, San Francisco, Cal.
Rupert Kennedy Stockwell, Rancagua, Chili
Samuel Wright Tay, Honolulu, Hawaii
Charles Herman Tornquist, Big Creek, Cal.
Dwight Cutler Trevarthen, Lincoln, Ala.
Allen van Rensselaer, Victoria, B. C., Canada
Henry Godlove Vollmer, Burlington, Iowa
Isaac Spurr Voorhees, Klamath Falls, Ore.
Harry Bruce Walker, Manhattan, Kans.
Gaylord D. Weeks, Springfield, Mo.
Gilbert Clinton Whitney, New York City

Elected as Juniors

Albert Richard Nelson Ahrens, Brooklyn, N. Y.
Ralph Tisdale Alger, Kent, Ohio
William Herbert Doughty Banck, Wilmington, N. C.
Arthur Jackson Barclay, Madison, Wis.
William Elijah Buell, Jr., Montreal, Que., Canada
Horace Kellogg Corbin, New York City
Forest Charles Dana, Seattle, Wash.
Henry Walke Dun, Jr., Albany, N. Y.
Raymond Arden Edwards, La Grange, Cal.
Edward Murray Frost, Cleveland, Ohio
William Charles Giffels, Detroit, Mich.
Earle Pierce Gray, Detroit, Mich.
Orin Wilson Harrah, Nashua, Mont.
John Henry Jones, Calgary, Alberta, Canada
Ferdinand Leiser, Jr., Brooklyn, N. Y.
Arthur Anthony McLaren, Cedars, Que., Canada
Laurence Kennedy Marshall, West Medford, Mass.
Guy G Mills, Urbana, Ill.
Martin J Orbeck, Alton, Ill.
Waldo Webster Skuse, Spokane, Wash.
Earl Audie Smith, Louisville, Ky.

Transferred from Associate Member to Member

Francis Wheelwright Belknap, New York City
Clinton Talcott Bissell, New York City
Arthur Clarence Douglas Blanchard, Winnipeg, Man., Canada
Thomas Johnstone Bourne, Wu I-An Huei, China

JOHN BOBBS CAMERON, New Castle, Pa.
WILLIAM NEVILLE COLLIER, Boston, Mass.
HANS ANDREAS DAAE, Sacramento, Cal.
CHARLES WELLS EDDY, Thomaston, Conn.
GEORGE ALEXANDER MILLER ELLIOTT, San Francisco, Cal.
JOHN ROBERT GRANT, Vancouver, B. C., Canada
GEORGE PRINCE HAWLEY, Cedars, Que., Canada
CLARENCE BOOTH LAMONT, Seattle, Wash.
JAMES ROBINSON MCCLINTOCK, New York City
HERBERT GRANVILLE MCCORMICK, Heidelburg, Ky.
THOMAS WORTH MARSHALL, Washington, D. C.
CAMILLE MAZEAU, Milford, Conn.
JOSEPH WILLIAM OBREITER, Jersey City, N. J.
GEORGE BIGELOW PILLSBURY, New London, Conn.
LOUIS JOHN RIEGLER, Pittsburgh, Pa.
EDWARD LAWRENCE SAYERS, Birmingham, Ala.
HARRY SIDENIUS, Calgary, Alberta, Canada
HARRY SPENCER SLOCUM, Cedars, Que., Canada
HAROLD CONVERSE STEVENS, New York City
EDGAR BRANSON THOMAS, Cleveland, Ohio
SUTTON VAN PELT, Chicago, Ill.
JOSEPH PALMER WADHAMS, New Haven, Conn.
RALPH WHITMAN, Annapolis, Md.
CLIFTON WHITE WILDER, New York City
NORMAN RAND WILLARD, New York City

TRANSFERRED FROM ASSOCIATE TO ASSOCIATE MEMBER

FREDERICK WILLIAM GREEN, Stamps, Ark.

TRANSFERRED FROM JUNIOR TO ASSOCIATE MEMBER

JAMES WILHELM CARPENTER, Cleveland, Ohio
ELIHU CUNYNGHAM CHURCH, New York City
FRANK YOUNG DORRANCE, Montreal, Que., Canada
IRVIN SUTTON GRINDROD, Philadelphia, Pa.
EDWARD PARMELEE HAMILTON, New York City
ALFRED BRACKENRIDGE HEISER, Brooklyn, N. Y.
LOUIS WILLIAM KLINGNER, Belleville, Ont., Canada
GEORGE HORACE MACK, Hampton, Iowa
ALFRED WORCESTER NORDWELL, Piedmont, Cal.
HENRY HURD RENNELL, New York City
RAFAEL JOAQUIN TORRALBAS, Havana, Cuba
ELLIOTT VANDEVANTER, Baltimore, Md.
LESLIE CLIFFORD WHITTEMORE, Chicago, Ill.

OF THE BOARD OF DIRECTION

(Abstract)

June 2d, 1914.—The Board met, as required by the Constitution, at the Forty-Sixth Annual Convention, at the Belvedere Hotel, Baltimore, Md., June 2d, 1914, at 10 P. M.; President McDonald in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bush, Cattell, Connor, Cummings, Edwards, Fuller, Haskell, Hodge, Leonard, Loweth, Montfort, Ockerson, Smith, Swain, Thomson, and Tuttle.

The Secretary presented the following report:

"To the Board of Direction
of the American Society of Civil Engineers:

"The undersigned, appointed at the last meeting to consider the matter of a proposed Memorial to the late Alfred Noble, Past-President, Am. Soc. C. E., beg leave to report as follows:

"That, in the opinion of your Committee, such a Memorial is desirable, and should be undertaken by this Society, and should be on no small scale. Your Committee suggests that the Civil Engineers of the world be asked to subscribe to the funds for this purpose, and that the Memorial take the form of an appropriate bronze statue to be erected in some suitable place.

"In view of the fact that much of Alfred Noble's professional practice was National in character; that he was an adviser of Presidents, and consulted in some of the most important Engineering work of the country, your Committee believes that such a recognition of him personally, and of the Profession of Engineering, would meet with universal approval.

"It is therefore the opinion of your Committee that the Capital of the Nation is the proper location for such a statue, and that the Congress, or other body in authority, be requested to provide a suitable site. Your Committee, therefore, makes the following recommendations:

"(1) That this Society undertake the erection, in a suitable location, of a Statue to the memory of Alfred Noble—the Engineer and the Man.

"(2) That the Board of Direction immediately set aside the sum of one thousand dollars ($1 000) as the first subscription toward the necessary funds.

"(3) That the funds for this purpose be secured by subscription from the Engineers of the World.

"(4) That a Committee of five be appointed by the Board, in whose hands the carrying out of the project be placed.

"Yours respectfully,
"T. Kennard Thomson (*Chairman*)
J. H. Edwards
Chas. Warren Hunt."

On motion, duly seconded, the Report was received, and all of its recommendations adopted.

On motion, duly seconded, the President was authorized to appoint a Committee of five, with power, to carry out the suggestions made.

The President subsequently appointed as such Committee: Onward Bates, Chairman, Robert Moore, Samuel Rea, Samuel H. Hedges, F. H. Newell, and Chas. Warren Hunt, Secretary.

The Secretary presented the following Resolution prepared by Messrs. Thomson and Smith:

"Whereas: By the death of Alfred Noble, the Engineering Profession in America has lost its most prominent member, and

"Whereas: Mr. Noble has been connected with this Society for forty years, and has served upon its Board of Direction for nine years, as Director, Vice-President, President, and finally as a Past-President, be it

"Resolved: That the Board of Direction of the American Society of Civil Engineers acknowledges the indebtedness of the Profession to this wise counselor, active and tireless worker, who, during his connection with this Board and subsequently, gave ungrudgingly and unselfishly so much of his valuable time for the general good, and be it further

"Resolved: That this Board desires to spread upon its records its sense of profound sorrow in the great loss, not only to the Profession of Engineering, but to the world, of one who by his strong and intellectual personality, earnestness of purpose, sterling honesty, and great heart, has set an example for Engineers of the future, and in so doing endeared himself to all with whom he came in contact."

On motion, duly seconded, the Resolution was unanimously adopted, and the Secretary instructed to forward copies of it to members of Mr. Noble's family, and to others interested.

The Secretary presented the following Resolution prepared by Messrs. Hodge and Bush:

"It is with deepest regret, saddened hearts and impressive sense of a great loss that we record the recent death, on April 16th, 1914, of our Fellow-Member and Director of the American Society of Civil Engineers, Mr. Emil Gerber.

"Our Society and Board of Direction appreciated him as a man of broad and sound engineering ability and judgment; as a man of the very highest character and integrity; as a man whose conclusions and opinions were the result of careful deliberations always tempered by a good measure of heart; and as a man always active and intensely interested in the very best welfare of our Society.

"Resolved: That these thoughts of him be made a part of the minutes of this meeting of our Board of Direction, and that this Board extend to Mrs. Gerber and others with close ties to him our sincere sympathy and regret for the great loss which has befallen them."

On motion, duly seconded, the Resolution was unanimously adopted, and the Secretary instructed to forward copies of it to members of Mr. Gerber's family, and to others interested.

Appropriations were made for the work of six of the Special Committees of the Society.

The title of the Special Committee on Bituminous Materials for Road Construction was changed by striking out the word "Bituminous," so that the Committee is now a "Special Committee to Report on Materials for Road Construction."

Announcement was made that President McDonald has appointed Messrs. Ralph Modjeski, Onward Bates, and Chas. Warren Hunt, a Committee to prepare a memoir of the late Alfred Noble.

The following Preamble and Resolutions relating to the Duties of Consulting Engineers were unanimously adopted:

"*Whereas:* The Special Grand Jury of the County of New York, as reported and widely circulated in the daily press, has recently made a presentment impugning the professional standing and honor of the three Consulting Engineers of the Board of Water Supply of New York, one of whom has since that time died, honored and revered by the entire engineering profession and by all who knew him; and

"*Whereas:* The presentment in question sets forth the opinion of the Grand Jury in this matter substantially as follows:

" 'That the employment by the said Board of Water Supply of a staff of salaried consulting engineers can only be justified upon the theory that these consulting engineers are such in fact and that when called upon for the expression of an opinion in connection with any contemplated work that such opinion, when expressed, is their own independent opinion, reached by them without foreknowledge of the opinion already formed and expressed by the regular engineering staff of the said Board of Water Supply.

" 'The evidence presented to us shows that in certain instances the opinion of two of the three consulting engineers at present employed by the said Board of Water Supply was a mere reiteration of that already expressed by the chief engineer of the said Board of Water Supply, with a copy of which the consulting engineers had been provided before their own opinion was expressed. The third consulting engineer in one case, the only one who appears to have acted at all independently of the chief engineer of the said Board of Water Supply in his final report disagreed with the other two and his opinion was not acted upon, and it is our belief that the work involved cost the City of New York approximately two hundred and fifty thousand dollars more than would have been the case had this last opinion been adopted.

" 'During this investigation the three consulting engineers now employed by the said Board of Water Supply suggested to the said Board that their salaries be reduced from six thousand dollars to three thousand dollars a year each and this reduction was made on January 1, 1914. If the opinions of these consulting engineers are to be, in the future, a mere reiteration of the opinions expressed by the regular engineering staff of the said Board it would be for the best interests of the City that they resign, and those positions be abolished.'

"*Whereas:* The standing and attainments of all three of the said Consulting Engineers are well known to be such that any professional

opinion emanating from them or from any one of them could not be other than independent and reliable; and

"Whereas: The mode of professional procedure advocated by said Grand Jury is not consistent with good business, and, if carried out, would result in practice which would be neither ethical nor professional, and would be contrary to that established by experience the world over in the Engineering, Architectural, Medical, and Legal Professions, in that it would deprive the Consultants of information regarding the course previously pursued by the Engineer in Charge, and would require each one of them to duplicate much of the work already performed by the regular engineering organization in preliminary investigations, studies, estimates, and analyses, and thereby greatly increase the engineering expense without attendant advantage or benefit: be it

"Resolved: That the Board of Direction of the American Society of Civil Engineers wishes to place on record its condemnation of a procedure which permits a public criticism of sound and proper professional practice, and, based upon such erroneous criticism, a reflection on the honor, integrity, and professional standing of reputable Engineers: and be it further

"Resolved: That the Secretary of the Society be instructed to forward a copy of these Resolutions to the presiding Judge of the Court to which this Special Grand Jury reported, to the District Attorney of the County of New York, to the Mayor of the City of New York, and to the technical and secular press."

The Secretary reported the following appointments:

Rudolph P. Miller to fill the vacancy on the Special Committee on Steel Columns and Struts caused by the death of Emil Gerber.

C. G. E. Larsson to fill the vacancy on the Special Committee on Stresses in Railroad Track caused by the death of Emil Gerber.

Nelson P. Lewis, Chairman of the Special Committee to Investigate the Conditions of Employment of, and Compensation of, Civil Engineers, to fill the vacancy caused by the death of Alfred Noble.

That H. M. Byllesby had requested to be retired as a member of the Special Committee on Valuation of Public Utilities.

Charles S. Churchill, William J. Wilgus, and Henry E. Riggs, as members of the Special Committee on Valuation of Public Utilities, to fill the vacancies caused by the retirement of Mr. Byllesby from the Committee, and by the deaths of Messrs. Noble and Johnson.

William L. Saunders and Chas. Warren Hunt to represent this Society on a Joint Committee of the five National Engineering Societies for the Reception of Foreign Engineers during 1915.

The following Resolutions were adopted:

"Resolved: That it is the sense of the Board that the number of Geographical Districts into which the Society is divided for representation on the Board of Direction should be increased from 7 to 13."

"Resolved: That it is the sense of the Board that an amendment should be prepared and placed before the Society increasing the number of Geographical Districts from 7 to 13."

Adjourned.

June 24th, 1914.—A Special Meeting of the Board to canvass ballots and to consider applications for membership was held at 8.30 P. M., Past-President Bates in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Bush, Cattell, Cummings, Endicott, Hodge, Montfort, and Tuttle.

Ballots for membership were canvassed, resulting in the election of 21 Members, 45 Associate Members, and 21 Juniors, and the transfer of 13 Juniors to the grade of Associate Member.

Twenty-nine Associate Members were transferred to the grade of Member and one Associate was transferred to the grade of Associate Member.

Applications for membership were considered.

Adjourned.

REPORT IN FULL OF THE FIRST, SECOND, AND THIRD SESSIONS (THE SECOND SESSION BEING THE BUSINESS MEETING) OF THE FORTY-SIXTH ANNUAL CONVENTION, BALTIMORE, MD.

FIRST SESSION.

Tuesday, June 2d, 1914.—The Forty-sixth Annual Convention of the American Society of Civil Engineers opened at the Hotel Belvedere, at 10 A. M.; Francis Lee Stuart, M. Am. Soc. C. E., Chairman of the Local Committee of Arrangements, in the chair; Charles Warren Hunt, Secretary; and present, also, about 350 members and guests.

FRANCIS LEE STUART, M. AM. SOC. C. E.—Gentlemen, and Members of the American Society, and our Guests: As Chairman of the Local Committee of Arrangements, I have been asked to call the meeting to order. I, therefore, declare the Forty-sixth Annual Convention of the American Society of Civil Engineers in session. The Local Members of the Society, and the Engineers' Club of Baltimore extend to you greetings, and give you a hearty welcome to our City.

The Local Members feel a pride in the beautiful City of Baltimore and the progressive works in engineering that are going on, in the strides we are making, and the preparation to extend and keep its place among the foremost cities of the country. As a leader in this movement, and one who is working with great effect for Greater Baltimore, and one who is empowered to speak for the City, I take pleasure in introducing to you the Honorable James H. Preston, Mayor of the City.

Address of Welcome.

HON. JAMES H. PRESTON.—Ladies and gentlemen, and Mr. President, it is with a great deal of pleasure that I welcome you to Baltimore on this occasion. I have the opportunity, the duty, and the pleasure to welcome a great many societies to Baltimore. Baltimore is a convention city, almost. I have welcomed a dozen in the last three days, I think, large and small. We have a good many opportunities to welcome engineers particularly, and we are particularly gratified to have engineers in our midst; and it is with more than the usual pleasure that I am here to welcome you—the association of leading engineers of the United States—to Baltimore on this occasion.

I feel a great obligation to engineers; they are doing so much for the upbuilding of our city. I do not know what I would do without them. I have almost become an engineer myself. We have some very distinguished engineers, many of whom you know, and I have—excuse me for saying it in confidence—I have a great deal of trouble with them sometimes. There are a great many conflicting

views, you know, so that I have to constitute myself a chief engineer, in order to get the whole thing to work harmoniously.

We have some very distinguished men here, many of whom you know. We have Mr. Calvin W. Hendrick, who is a hand-picked article from New York, to whom we pay a very high salary. Everybody is very jealous of him; he gets $10 000 a year, more than Mr. Mathewson, the chief engineer of the "Giants" gets, I think. And then we have a whole lot of other engineers here who do not get as much, and who are pretty sore because they do not get as much; but they are all doing work of a high order.

You see, Mr. Hendrick works on the sewerage system, and he is doing a great work. The only objection I have to him is, he does not drink or smoke. We have some other engineers, however, who do, and make up for it. And then we have Mr. Lackey, who is a very brilliant young man, endowed with a very brilliant imagination. He wants me to borrow $50 000 000 to put in the harbor, to improve the harbor. It is very easy to spend other people's money. I expect you engineers know that. I once knew a man who was so unselfish that he was willing to send all his wife's relatives to the war. That is a good deal like some of these engineers who are spending other people's money. But it is a good thing to spend money, because you cannot build unless you do spend money.

Mr. Lackey is a very admirable young harbor engineer. I try to get young men for engineers. And then we have Mr. R. Keith Compton, who is a very admirable engineer. He is putting down $10 000 000 worth of new paving. The only trouble is that I cannot get him to spend his money fast enough. One man wants to spend too much and the other not enough. And I have a very admirable city planner, Major Shirley, whom you all know. I think he must have gone to fight the Mexicans, as I do not see him this morning. When he is not in uniform he is a splendid engineer, and when he is in uniform he is a splendid soldier. Then we have Mr. F. W. McKinney, who is doing a great deal of paving, and Mr. Raleigh Thomas, who is putting down our electric subways. These subways are to pay their own expenses and to cost the city nothing, because we rent them to the railways and the electric light companies and other corporations.

All these things—I will not enumerate them, but we have a number of engineers, and they are helping me build a new Baltimore. We had Mr. Whitman, a high-class man who put in our dams here. He has just left us and gone into business as a consulting engineer.

So, you see, I am enthusiastic about engineers, enthusiastic about welcoming them to Baltimore. Last night I welcomed the steam engineers to Baltimore. They had a gathering, not as large as this.

Address of Welcome (continued).

I did not say this to the steam engineers, but there is one thing about the civil engineers—if I, in this presence, may be permitted to make such a criticism—there is not enough steam behind them. I would like to get a little more steam behind our civil engineers. I did not tell this to the steam engineers; I told them they had plenty of steam behind them, and how valuable that steam was in lifting materials and weights and doing heavy engineering work. But I suggest to our city engineers that a little steam behind them would help them in accomplishing the work they are doing. They lay down line upon line and precept upon precept, as the Good Book says, and they don't make any mistakes, but sometimes I almost wish they might go a little faster.

Gentlemen, I hope you will like Baltimore; many of you, I know, do. Many of you know it and like it. I call it a little city, because, compared with New York, from which many of you come, it is small; but we have 700 000 people in the most congested territory in the world. We have the highest population. And we have a beautiful harbor. No port charges. We have good railway facilities and the most beautiful system of parks I think in the world. We have an excellent railway system. We have an excellent sewerage system, and an admirable filtration plant. We have a beautiful climate. We have this weather all the year around—ordered it specially for you, and are going to keep it on, certainly as long as you are here. Sometimes we have a little rain.

We are an old town being rebuilt, new sewers, new parks and streets. I have built a new school system since I have been here, in spite of the opposition of a good many of the community, but to my own satisfaction.

I will not tell you what the defects of the chief engineer of the city are. You will read of them in the newspapers. I do not admit that there are any, but you will read of my defects in the newspapers. I hope you will enjoy not only our beautiful city and our beautiful hotels and your rooms, but the cooking you will find in Baltimore—the hard crabs, the soft crabs, the oysters, and the shad. I hope you will enjoy, not only your trip down the Bay, but your trip to our beautiful little city on the Severn, to which you have devoted so much time in your programme. I hope that you will enjoy your trip to Baltimore, and that you will all come again.

We are rebuilding our city, and to none do we owe a greater debt of gratitude, to none are we under greater obligations, to none will we owe more in the future, than to the engineers, of whom we find the chief representatives here to-day.

I welcome you to Baltimore.

THE CHAIRMAN.—Mr. Mayor, we thank you. Once a year the six thousand and more members of the American Society pick out a

man, known of reputation and known as a man, and honor him with the greatest honor in the gift of our Society, that of election to be President of the American Society of Civil Engineers. I introduce Mr. Hunter McDonald, who has that honor.

Reply to Address of Welcome.

HUNTER MCDONALD, PRESIDENT, AM. SOC. C. E.—Mr. Mayor, the engineering profession of America owes the City of Baltimore a great debt. You have prepared a pamphlet in which you have listed a large number of things that the City of Baltimore is first in. You have omitted a very important thing, and that is that the first meeting of engineers that ever took place with a view of organizing a society of engineers, took place in Baltimore. You ought to add that to your list the first thing. That meeting took place at Barnum's Hotel on February 11th, 1839.

We also owe the City of Baltimore a debt in that it is the first city that I recall that builds monuments to engineers other than those they build themselves. Usually, the engineer's monuments are his own and many of them are below ground. In this city they have just unveiled a monument to Ferdinand Latrobe, who, I understand, was an engineer, and I believe was a brother of Benjamin H. Latrobe, one of the pioneers in engineering in the United States, and to whom our profession owes a great debt of gratitude.

You have also built a monument to another one of your famous citizens, who was also a city engineer, and that is Mr. John M. Hoyt, President of the Western Maryland Railroad.

The City of Baltimore, having been the origin of one of the best systems of railroads in the United States, the Baltimore and Ohio, the profession is very greatly indebted to it, because we have all been enabled to get examples of good engineering work and good management from so great a system of railroads.

We even owe you a debt of gratitude on account of the things that have taken place in your adversity, and that is your great fire. The engineers of the United States have been able to draw a great many valuable lessons from that fire. They have learned how to build fire-resisting structures much better than they ever knew before that fire took place; and it is with a great deal of pleasure that I extend to you our thanks.

(The President then delivered his Annual Address.*)

The Secretary has some announcements to make.

Announcements Regarding Excursions.

THE SECRETARY.—The Local Committee has asked me to say a few words in reference to the excursions of Thursday. There will be a meeting in this room at 10 o'clock in the morning of Thursday, when brief addresses will be made descriptive of the engineering work which is to be looked at in the afternoon; and parties will be made up, in the first place to make a trip to see the city planning and paving.

*See page 1815 of Papers and Discussions.

Announcements (continued).

There is a harbor inspection trip, a sewerage inspection trip, and a water supply inspection trip. Now the point that I want to make is that you can only go on one of these excursions, and it is necessary that the number going on each be known, on account of providing for transportation and, in some cases, luncheon, and so forth. Tickets for these excursions are ready at the Secretary's office, and the Committee requests each member to decide which excursion he wishes to take and let the Secretary know it as soon as possible. Otherwise, the committees will be in trouble in taking care of the people.

The President asks me to announce a meeting of the Board of Direction of the Society to be held this evening after the adjournment of the Business Meeting.

THE PRESIDENT.—There being no further business, the meeting is adjourned.

SECOND SESSION, BUSINESS MEETING.

Business Meeting Called to Order.

Tuesday, June 2d, 1914.—The meeting was called to order at 8.30 P. M.; President Hunter McDonald in the chair; Charles Warren Hunt, Secretary; and present, also, about 200 members, and a number of guests.

THE SECRETARY.—Gentlemen, the President requests that you come forward and sit as near as possible to the front, so that you can hear what is going on.

THE PRESIDENT.—The members will please come forward and I will call the meeting to order. I will ask that members who rise to speak will please see that their names are given loud enough so that the Secretary will be able to get them down, and that those who have any remarks of length to make will please come forward, so that they can be heard to better advantage.

Proposed Code of Ethics.

The subject we will take up first will be the proposed Code of Ethics. The Secretary has some written communications on this subject to submit to the Society, and we will hear them first.

THE SECRETARY.—Mr. President, the following letters have been received:

"ST. LOUIS, MO., May 5, 1914.

Letters Relating to Proposed Code of Ethics.

"MR. CHAS. WARREN HUNT, *Sec'y*,
"American Society of Civil Engineers,
"220 West 57th St., New York City.

"MY DEAR MR. HUNT:—I will be unable to go to the Annual Convention, but I am quite interested in the 'Code of Ethics' and if it is adopted I think it will be a very good thing, but it hardly seems to go far enough, as if a member does not live up to them, what will the Board do about it? It seems to me there should be some method like in the Architects' Society, by which proper punishment so to speak should be administered by some body, such as by a committee on grievances.

"There is only one of the articles that I do not quite understand and that is Article V. I shall take my own case for example. The last few years I have been doing nothing but consulting and advisory work, and it very often happens that in banking institutions and individuals who are negotiating for large blocks of securities, they come to me and ask my opinion and advice whether or not the proposed purchase would be a good one. They submit to me all the data connected with the property for examination. I very often do not know who the engineers are, and I render my opinion as to the value of the securities on the data submitted, and it also often requires a personal examination of the property.

"When a new scheme is projected and the promoters take it to a banking house or a syndicate in order to try to raise the money, the banking house or syndicate as a rule select their own engineer to make the examination of the plans and specifications and the general business prospects of the proposed company. The designing engineer, as a rule, knows nothing about who the promoters are negotiating with. Now how would Clause V affect the engineer to whom these plans and prospects of the company are submitted for examination? Would such work be barred under the clause?

"Again, plans for improvement are often submitted to an engineer by owners or municipalities, and as a rule he does not know who the engineers are that have designed them. How would that be affected by Article V?

"There seems to be among bankers and syndicates that are formed to build properties, a general scheme of employing engineers to design a plant and then they pay their engineers and take these plans and specifications, etc., to other engineers to pass upon. This is something that engineers cannot control, *i. e.*, what the owners of a proposed plant will do with their plans. Now in such cases would the engineer to whom they are submitted for approval be required to look up and find out who the designing engineer was, and ask his permission or consent to pass upon them?

"In the matter of competition, it often occurs that people come into the office of an engineer, even large banking firms, and talk over a projected work with him and ascertain his charges. In a few days they may come back and tell him that they had also taken the matter up with so and so, who had given a price for the work either on a percentage basis or a daily charge with expenses very much under his, and then offer him the work at the same price of the other party. In such a case it generally comes out that they have given the original terms to the other party and the writer in such instances has invariably declined to take the work. In a number of cases it has turned out that the engineers who took the work have lost money on it, and then would want to arbitrate their claim for extra fees, and I have quite often been nominated to pass on the claim. This I have always refused to do.

"I tell you of these little incidents that have occurred in my practice, as they might be of some benefit when outlining a concise paragraph to guard against such performances, and to qualify Article V so it does not throw the burden on a Consulting Engineer to ascertain who has made the plans, specifications, etc., when projects

Letters Relating to Proposed Code of Ethics (continued).

are submitted to him for his opinion where the names of the engineers are not given on the data submitted.

"With kind regards,

"Sincerely,

"CHAS. H. LEDLIE."

"20 MAY, 1914.

"CHAS. WARREN HUNT, ESQ., *Secretary,*
"American Society of Civil Engineers,
"220 West 57th Street,
"New York City.

"DEAR SIR:—I have your circular letter of April, 1914, with reference to a code of ethics to be submitted to the business meeting at the annual convention to be held in Baltimore on June 2.

"I note that under Section 1 an engineer is forbidden—

"'1. To act for his clients in professional matters otherwise than as a faithful agent or trustee, or to accept any remuneration other than his stated charges for services rendered his clients.'

"As consulting engineer for a large and reputable mining company, I receive a stipulated annual retainer, and for special work it is understood that I am at libery to charge an additional fee. Some time since this mining company took an option to purchase the majority of the stock of another mining company, and at my request its directors permitted me to participate in the purchase. I have paid for this stock and now own it.

"I believe that some of the greatest engineers, and men rated most highly in the profession, have obtained very valuable interests in this way, and at the same time commanded the highest respect of the community and of the profession.

"Is there anything in paragraph 1 prohibiting a mining engineer from serving a company under salary and at the same time participating with it in the purchase of a property? It seems to me that the wording of paragraph 1 would forbid such action.

"I contend that my action in purchasing an interest in the property above referred to was legitimate and right; I contend that I have the right to serve a mining company as an engineer for pay, and at the same time to participate with it in the purchase of a mining property; I contend that it would be very questionable for an engineer to accept such responsibility if there was the least hint of stock-jobbing in the transaction, and I contend that no society or person can lay down a code of ethics that could either forbid or approve such action as a general proposition.

"I understand that technically it might be held that this participation of mine is not to be considered as actual compensation, but as an entirely separate transaction aside from my services as a consulting engineer, but why should the board of directors of a large and wealthy company permit its engineers to participate in the purchase of new property if it is not on the general principle that it will benefit its shareholders? It could only be on such a theory, it seems to me, that an act of this kind would be permissible.

"I, for one, desire to protest most vigorously against the paragraph quoted.

"Yours truly,

"L. D. RICKETTS."

"MAY 8, 1914.

"MR. CHARLES WARREN HUNT,
"*Secretary,* Am. Soc. C. E.,
"220 W. 57th St., New York.

"DEAR SIR:—The undersigned does not expect to be present at the business meeting of the annual convention, scheduled for the evening of June 2. He accordingly suggests by letter that the word 'employment' in the proposed Code of Ethics be changed to 'engagement,' as one better suited to a proposed professional code. If engineers speak of being 'employed' rather than 'engaged', those who engage them are all the more likely to refer to them as being 'hired'.

"Will you kindly see that this recommendation is reported at the meeting in question.

"Very truly yours,
"EDGAR MARBURG."

"CHICAGO, May 11, 1914.

"Mr. CHAS. WARREN HUNT, *Sec'y,*
"American Society of Civil Engineers,
"220 West 57th Street,
"New York City.

"DEAR SIR:—Please see my letter of April 30th, 1914, to you—my remarks on a 'Code of Ethics'.

"Will you be kind enough to destroy that letter and substitute this letter in its place.

"I have your circular to the members of the Society on a Code of Ethics.

"I should object to paragraph 5. A railroad company or private corporation frequently asks its Engineering staff for a report, and then asks some Consulting Engineers for an opinion of it so as to be fully advised. It certainly would be embarrassing and unnecessary for the railroad company or corporation to ask permission of its employe about employing some one else to review the report.

"Paragraph 6 depends on what you mean by it. I think it is pretty strong language to use. It is impossible in many cases to avoid giving a prospective employer information in regard to your work. With some engineers it might seem self-laudatory and with others it might seem simply a statement of facts.

"I should vote to eliminate No. 5 and modify No. 6.

"Yours very truly,
"J. B. BERRY."

"MAY 6, 1914.

"MR. CHARLES WARREN HUNT, *Secretary,*
"American Society of Civil Engineers,
"New York City.

"DEAR SIR:—I am sorry that I cannot attend the Baltimore Convention.

"I am sorry that it is necessary for the American Society to adopt a code of ethics, for it seems that the things therein mentioned should certainly be observed, especially that part bearing on the attitude of one Engineer toward another concerning work engaged upon.

Letters Relating to Proposed Code of Ethics (continued).

"In this section it seems absolutely necessary for Engineers to solicit work as it is the custom practiced by even the oldest and best Engineers. As a young man entering the profession, this is one of the most distasteful and embarrassing features of it.

"The comment in the last *Engineering Record* suggesting that some penalty be applied seems good, for one who will not abide by the code of ethics without the written code, will probably not hesitate to violate the written and adopted code, unless there is a penalty.

"Even if the action of the society would control the relation among its members it could not protect those members from the 'rate cutting' and other unprofessional methods of Engineers not members of the Society, but this condition, of course, affects only those who have to compete with men who are not members of the Society, and if the Society should want to give such protection and benefit the profession as a whole they would probably have to influence the different State laws, so they would govern all Engineers.

"Yours very truly,
"MASSENA L. CULLEY."

"MY DEAR MR. HUNT:—I trust the code will be adopted. I also trust that the following portion of the 6th section, *viz.* 'or in any other manner derogatory to the dignity of the Profession' shall include sending one's picture to the newspapers when one hears a rumor that he is to be offered a better job, and then, when the offer arrives, to furnish the papers with an enlarged copy of the awful example.

"Yours truly,
"GRANVILLE W. SHAW."

"APRIL 28th, 1914.

"To the Board of Direction,
"Amer. Soc. C. E.,
"220 W. 57th St., New York.

"GENTLEMEN:—I have in sight the proposed 'Code of Ethics'—excellent beyond the peradventure of a doubt, but why advertise to the world that our membership needs training in elementary business—moral principles?

"If, and I am optimistic enough to doubt it, any appreciable portion of the membership fails in living up to these principles, let the power of the Society be used to eliminate such members and let the reason be known; also use greater care in admitting to membership; making, perhaps, the essence of such a code part of the application literature, but not setting it forth as a 'Code of Ethics' for a National organization.

"Yours very truly,
"LOUIS L. TRIBUS."

"CHICAGO, ILL., April 28, 1914.

"The American Society of C. E.,
"MR. C. W. HUNT, *Secy.*

"GENTLEMEN:—Article 6 of the code of ethics proposed by the Board of Direction, as worded, may be construed as disapproving an advertisement in the classified columns of an engineering periodical, by an engineer seeking employment. It is certainly not intended to

condemn such publicity and the wording should not be broad enough to be so construed. The clause 'or in any other manner derogatory to the dignity of the Profession' appears to the writer much too general for a code. If we are to adopt a code it should be specific. If the first clause of this article (6) explains the second, the second may well be omitted. If the second clause has any definite meaning, and we know what that meaning is, we should express it definitely.

"Yours very respectfully,
"P. E. STEVENS."

"PHŒNIX, ARIZ., May 4, 1914.

"*American Society of Civil Engineers,*
"MR. CHAS. WARREN HUNT, *Secretary,*
"220 W. 57th St., New York City.

"GENTLEMEN:—I am in receipt of circular letter relative to the 46th Annual Convention, and I regret exceedingly that I will not be able to attend the convention. I am enclosing herewith blank filled in as requested.

"I do not know as it was intended that members should reply to the circular regarding the Code of Ethics, but I cannot refrain from saying how pleased I am that the Board of Direction is giving consideration to this very important matter, and I sincerely trust that their action will be approved at the Annual Convention, and that this Code as outlined will go through without the change of a word.

"Yours very truly,
"HOWARD S. REED."

Theo. S. DeLay, Assoc. M. Am. Soc. C. E., wrote as follows in reference to Section 5 of the Code of Ethics: "Do not approve this. Am glad to have any competent man check any of my work at any time."

Walter Katté, M. Am. Soc. C. E., wrote as follows: "I decidedly approve [of the Code of Ethics] and hope it will be confirmed by the vote of the Convention."

"NEW YORK, June 1, 1914.

"MR. CHAS. WARREN HUNT,
"*Secretary,* American Society of Civil Engineers,
"Hotel Belvedere, Baltimore, Md.

"DEAR MR. HUNT: Referring to the proposed Code of Ethics, which is to be discussed at the Business Meeting of the Baltimore Convention, I would like to suggest that in the paragraph numbered 5 of the said code the words 'or consent' should be omitted.

"It is not at all clear just what meaning these words have, particularly as the alternative 'knowledge' is included in the paragraph. Certainly there might be knowledge without consent, but there could, on the other hand, be no consent without knowledge.

"It may be that if the purpose of the framers of this paragraph of the Code were known, no objection could be raised, but it does appear as though the introduction of these inconsistent words does not operate either to strengthen the Code or to make its meaning more clear.

"I shall be unable to attend the Business Meeting and would ask, therefore, that this letter be read.

"Very truly yours,

"THADDEUS MERRIMAN."*

Discussion on Proposed Code of Ethics.

THE PRESIDENT.—Gentlemen, this is the report of the Board of Direction, and this Code of Ethics is recommended by the Board for adoption by the Society. The matter is now open for discussion by the members present. This code is subject to amendment, or whatever action this meeting may see fit to take regarding it.

I want to ask once more, when members rise to speak on the subject, that they, if the Chair does not know their names, will kindly give them so that the Secretary can record them.

JOHN A. OCKERSON, PAST-PRESIDENT, AM. SOC. C. E.—Is this matter to be decided at this meeting at the present time, or is it to be subjected to this meeting for approval, and if approved, to go to letter-ballot?

THE PRESIDENT.—We are to approve it or condemn it, and if we approve it, it goes to the membership for letter-ballot.

MR. OCKERSON.—To get the matter before the meeting, I move the adoption of the Code of Ethics as presented by the Board of Direction.

THE PRESIDENT.—Has the motion a seconder?

A MEMBER.—I second the motion.

THE PRESIDENT.—It is moved and seconded that the Code of Ethics as presented on the leaflet—doubtless all the members have it—be adopted.

T. KENNARD THOMSON, M. AM. SOC. C. E.—Is there any discussion on the motion first, sir?

THE PRESIDENT.—Discussion is in order. Possibly the members present would like to hear this Code read. I do not know that all of them are familiar with it.

The Secretary read the proposed Code of Ethics, as follows:

"At a meeting of the Board of Direction, April 1st, 1914, the following proposed Code of Ethics was ordered submitted to the Business Meeting of the Annual Convention to be held at Baltimore, June 2d, 1914, at 8.30 P. M., with the recommendation of the Board that it be adopted by the Society:

"CODE OF ETHICS.

"It shall be considered unprofessional and inconsistent with honorable and dignified bearing for any member of the American Society of Civil Engineers:

"1. To act for his clients in professional matters otherwise than as a faithful agent or trustee, or to accept any remuneration other than his stated charges for services rendered his clients.

* Mr. Merriman's letter was received too late to be presented to the Business Meeting. It is printed here for the information of the membership.

"2. To attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects, or business, of another Engineer.

"3. To attempt to supplant another Engineer after definite steps have been taken toward his employment.

"4. To compete with another Engineer for employment on the basis of professional charges, by reducing his usual charges and in this manner attempting to underbid after being informed of the charges named by another.

"5. To review the work of another Engineer for the same client, except with the knowledge or consent of such Engineer, or unless the connection of such Engineer with the work has been terminated.

"6. To advertise in self-laudatory language, or in any other manner derogatory to the dignity of the Profession."

In accordance with the above action of the Board the question of the adoption of this Code by the Society is now presented to this Business Meeting.

MR. THOMSON.—Mr. President, as a member of the Board of Direction, I would like to differ with this proposed Code of Ethics. It seems to me that the Code of Ethics proposed enables an engine driver to drive his engine right over. It seems to me to be a Code that will tie the hands of the scrupulous and untie the hands of the unscrupulous.

I understand there is a proposition which will enable the Board of Direction to expel a member, very much more easily that it does now, for any unprofessional action. I think it would be very much better to give the Board power to expel a man for any unprofessional conduct than to attempt to tie the hands of all the scrupulous engineers by such an incomplete Code of Ethics as that.

HENRY W. HODGE, M. AM. SOC. C. E.—I happen to be one of the committee that helped to draw that Code of Ethics. It has been said that you cannot reform men by legislation. You can. I do not say that the Code is perfect. You have heard Mr. Thomson say you had better give the Board authority to expel any member for unprofessional conduct. Unless you change the Constitution, you cannot do that. The Constitution needs an awful lot of changing; and if you are going to do that and give the Board such authority it will be a matter of great difficulty.

I want to say we have a man who has been in jail, a member of this Society. We cannot get him out of the Society. He will not resign. The Board of Direction has not the power to put him out. I do not say we can make good men and keep our men out of jail by this Code of Ethics, but we can tell them what a first-class Code of Ethics is. You cannot give the Board more power without an amendment of the Constitution, which is hard to get.

Discussion on Proposed Code of Ethics (continued).

When it was sought last winter to amend the Constitution, 1 300* out of 5 000 voted on the proposition.

THE SECRETARY.—No; 3 100 out of more than 6 000.

MR. HODGE.—3 100 out of more than 6 000. Not half the members voted. The other half did not know whether they wanted to vote or not. So here we have a chance at least to state what reputable engineers think. We are engineers. We are trying to elevate the engineering profession. The other professions have a code of ethics. The engineering profession has not. For that reason there are more reprehensible practices going on in this profession than in any other.

While this is not a permanent step, and while it does not give all the authority it should, it is a step in the right direction; and I hope that the good reputable engineers represented by this Society will take a step in the right direction by having a Code of Ethics like the other professions. We want to be on the same level.

D. O. CARR, ASSOC. M. AM. SOC. C. E.—This gentleman who spoke——

THE PRESIDENT.—Mr. Carr, will you face the audience?

MR. CARR.—Mr. Thomson accuses the Board of Direction of putting over a Code of Ethics that is in favor of the unscrupulous of the engineering profession. I have listened to the discussions read this evening. I studied the Code very carefully on its receipt by myself. I fail to see where that protects the unscrupulous engineer. I see where it takes one first-class dig at that class of engineers who have been a detriment to this Society, before I became a member and since; and I have come in contact with very undignified uses made of the engineering profession by this type—I speak of the contracting engineer.

These contracting engineers have preached to the people so long that they can get something for nothing that the engineering profession has been thrown down in the dirt and walked on; and I, as a young member of this Society, would like to see a rising up from this down-trodden position here by this class of engineers, who have had very strong control in this Society, and it is very evident to the younger members who have this control. We have been told time and again "We don't have to employ engineers." Bridge contractors, and so on, all the way around, give their services free. If they would write down here 5, 10, or 15% on this contract is for engineering charges, it would be fair to themselves and it would be fair to the engineers at large.

No; they don't do this. They preach to the people that we are giving you these engineering services free. Now, we are going before the people, trying to make them see that the engineers are a professional body of men, and as such they require certain remuneration commensurate with their services. What do you get? The contractor

* The actual vote here referred to was 3 177 out of a total corporate membership of 6 312.

leaves out the part that he is taking in this contract that should be applied as engineering fees.

The result is that the people look on the engineers the same as the engineers look on themselves. If the engineers do not think themselves worthy of a proper remuneration for their services, how can you expect the body politic to do it? I am sure that I for one would not, unless I was an engineer and knew what the services required. Now that Code of Ethics, as it is written, is detrimental to that class of engineers, and that is the type of engineer that we as engineers should either get rid of or so preach to the people and place them in their right position as not representing the profession of engineering. When that is done engineers will come up to the position where they want to be, and be classed by the people as a profession; and until that is done the engineers will be just what they are to-day.

THE PRESIDENT.—The Secretary has a communication from Mr. Thacher.

THE SECRETARY.—Edwin Thacher, M. Am. Soc. C. E., proposes this addition to the Code of Ethics:

"To knowingly infringe upon the patents of another engineer, employing his invention scientifically or otherwise, and accepting fees for same, thus laying himself open to just criticism by the patentee."

THE PRESIDENT.—Has Mr. Thacher's amendment a seconder?

LINCOLN BUSH, M. AM. SOC. C. E.—I second it.

THE PRESIDENT.—The amendment proposed by Mr. Thacher has been seconded, and the question is now on the amendment. Is there any discussion on the amendment?

MR. STUART.—I would like to raise my voice against the acceptance of that amendment. There is too much of a Supreme Court position that we would have to take to decide whether a patent was right or not; and I think we would be getting into pretty deep water.

E. W. STERN, M. AM. SOC. C. E.—On the amendment I must strongly agree with the last speaker. I suppose many of the members who are here to-night know the controversies that have taken place on the reinforced concrete, flat slab, long slab, and flat span question, and the reinforced concrete bridge question, and, I believe, as a previous speaker has said, that that is a matter for adjudication by the Courts.

A great deal of very undignified and unprofessional conduct has been foisted on the public by the members of our profession, and I am sorry to say, by members of the Society, who claim patents on things on which it has been proved in Court that they have no patents. How can this Society go into a question like that? It must be left to the Courts. I emphatically object to an amendment like that to a Code of this kind. I am heartily in favor of the others. Mr. President, may I speak on the others?

Discussion on Proposed Code of Ethics (continued).

THE PRESIDENT.—I think we had better dispose of this first. Is there any further discussion on the amendment?

GEORGE F. SWAIN, PAST-PRESIDENT, AM. SOC. C. E.—I strongly concur with the remarks of the last two speakers. It does not seem to me that we ought to assume in any way the position of a Court; but I would like to call attention to the fact that that matter is covered by Section 2 of the proposed Code, which says engineers shall not "attempt to injure falsely or maliciously, directly or indirectly, the professional reputation, prospects, or business of another Engineer," which would cover any attempt to interfere with his patents if they should be sustained by the Courts.

GEORGE H. SIMPSON, M. AM. SOC. C. E.—I would like to ask, are there any engineers who do such a thing as that?

THE PRESIDENT.—Any further discussion on Mr. Thacher's amendment? Are you ready for the question? (Cries of "Question.") The Secretary will read the amendment once more, and we will take a vote on it.

THE SECRETARY.—Mr. Thacher's proposed amendment is:

"To knowingly infringe upon the patents of another engineer, employing his invention scientifically or otherwise, and accepting fees for same, thus laying himself open to just criticism by the patentee."

THE PRESIDENT.—All in favor of adopting this amendment will say "aye"; opposed, "no."

The amendment is lost. The question is on the original motion. Any further discussion?

MR. STERN.—I am most heartily in favor of the proposed Code of Ethics as recommended by the Board of Direction. Without elaborating, or giving my reasons in detail, I would like to discuss some of the objections raised by the correspondents.

Mr. Ricketts brings up the question that an engineer who is retained as consulting engineer by a mining company or any other company, would be prohibited under the proposed Code of Ethics from owning stock in a corporation, the purchase of which he recommended. I do not see that he is right. I think he is wrong. An engineer has a right to buy stock in any corporation he sees fit, but if that engineer recommended the sale of stock which he owned, that would be an entirely different matter. He would be prevented by the Code of Ethics from recommending to the client the sale of stock which he owned. That, I think, is self-evident. I think that Mr. Ricketts, if he analyzes that clause carefully, will find that his conclusion is not based on the facts.

Another argument was advanced against the right of review by a fellow engineer. He thought it was not right that a banking corporation or a railroad corporation could not send the report of an engineer

to whomever they pleased for review. The Code of Ethics would not prohibit any proposed purchaser from submitting plans of a structure or a project which he was about to buy because the engineer who made that is not in their employment. The Code of Ethics says "for the same client" and I contend that that is right, for this reason: If a client, say a railroad or a corporation, employs an engineer to make a design for a specific piece of work, for which, if it proceeds to execution, he must be absolutely responsible in every way—if that corporation has enough confidence in him to give him that power, to give him the right to make those plans, and place it in his control, it is only courteous in them to say "I would like your judgment to be reviewed by such and such a one" and, if he is the right kind of a man, he would have no objection.

If the reviewing engineer is one who is known, and commands respect, he could not object, and if he did object, his client could say, "If you refuse to have your plans reviewed by Mr. So and So, who is a first-class man, we hereby dispense with your services, and you are paid off." That would be eminently proper.

But, on the other hand, if that same corporation—and business men are not always the best judges of the fitness of an engineer—were to retain some second-rate quack, we will say, to go over the work of a very capable man, he certainly should have the right to say what he knows about this man's ability, and discuss it with them. That is the case in other professions.

If a counsel is retained by a corporation, and that corporation retains another counsel without consulting him, I think there is not a reputable lawyer in the United States that would not resign on the spot and it is because of that that we do not command the respect of the business community, because these things are being done all the time.

Some years ago I was asked to review the work of another engineer by his clients. I said to them "I have no objection," but I simply put myself in his place, and therefore I suggested that it be ascertained whether he had any objection to my doing that. The other engineer had no objection to my appearing in the case. I listened to his side. It was very proper that I did so, because if I had not I would have made two or three points against him which I had formulated in my report.

My report was not entirely favorable to him. He had the right to review it, and we went over it together; but he felt that I was fair. I am glad to say that that same engineer is a personal friend of mine, and my report was not entirely favorable to him. The point is, that if I had not done that, I would have wronged him in two or three respects. I would have made a report on certain points which he cleared up.

Discussion on Proposed Code of Ethics (continued).

I think it is only fair that if it is done by another engineer it should be done in confidence. He can explain the reason, and the client, who is a layman, cannot. Every time that is done, the bankers or the railroad presidents—they are just as bad as the bankers, and you know what bankers and railroad presidents have done in the last few years in the running of American railroads—these gentlemen need some holding down, and we are the men to do it. We should insist on the adoption of the Code of Ethics, and insist on the public, in its relation to us, listening to it.

THE PRESIDENT.—Is there any further discussion?

FRANCIS R. WELLER, M. AM. SOC. C. E.—I would like to propose an amendment which I think will cover some of the discussed ground in relation to the engineers and contractors. In my experience and practice in the engineering profession I have found this, when an engineer has tried to play both ends of the game against the middle, as the old saying is, that is, when he has tried to pose both as a contractor and an engineer on the same work, that is all right, if his status is absolutuely defined beforehand; but there have been cases in my experience where an engineer has prepared plans for a piece of work, and then has bid on this same work in competition with other contractors.

Of course, it is evident that such a practice is highly reprehensible, because of the fact that contractors bidding on the work presume that they are all bidding on the same basis, whereas an engineer who has prepared the plans naturally is more familiar with the ideas which he wished to originate, and therefore, to a certain extent, he has the advantage, and particularly also he has the ear of the client for whom he has prepared these plans; and I offer this amendment for your consideration after careful study of the proposed Code of Ethics. I am very glad we are to have a written code, because, while most of the members of the American Society have heretofore, I am sure, lived up to the unwritten code of the Society, nevertheless we ought to have some definite expression of our practices in relation to our fellow-members.

The amendment I wish to offer is this:

"To bid for construction work in competition with contractors based upon plans and specifications prepared by him as engineer."

I do not know whether that is worded as clearly as it might be, but the intent is that an engineer should not bid on work as a contractor, on plans that he has himself prepared for his client in competition. In other words, he should be either one thing or the other. He should be the engineer on that particular piece of work or he should be the contractor.

In this amendment I do not wish to bar—and it does not bar—an engineer from doing both the engineering and the construction work,

if he does so after an agreement is entered into with the client, but it does bar an engineer from preparing plans and specifications for a piece of work, and then bidding in competition with the contractors; in other words, if an engineer desires also to do the contracting work he should do so on a basis arranged between himself and the client, and not presume to go into any apparent competition for the sake of getting the job.

Now a number of the members of the Society might express a doubt that this practice is prevalent. I do not wish to say that it is prevalent, but I do say that it occurs, and it occurs more frequently, probably, than a number of the members of the Society are aware of. I believe this amendment will absolutely define the relation of the engineer as a contractor on any particular piece of work.

I thank you, gentlemen.

THE PRESIDENT.—Has Mr. Weller's amendment a seconder?

A MEMBER.—I second it.

THE PRESIDENT.—The question is now before the house for discussion.

MR. STUART.—I want to oppose that amendment, Mr. President, for this reason: The Society needs a Code of Ethics, there is no question about that, and we want it in the simplest possible form. Now, amendments of that kind will lead to a book of amendments. We ought to bring it down to the simplest and the clearest language we can, and with the fewest principles, and those principles ought to be honesty, integrity, and appreciation of each other.

Now, in reading this Code of Ethics, and I have read it very carefully—I dislike even to discuss it—I would like to pass it as it is, because it is a very good effort, and it is a beginning. We are bound to have a Code of Ethics in the Society before we get through. We are just beginning now. We ought to have had a Code before.

I have not any axe to grind, because I am not a consulting engineer, and I am busy in my own profession. In Section 1 there is a clause which I just simply call to your attention. I do not like to have to make an amendment, I will leave that to somebody else: "To act for clients in professional matters otherwise than as a faithful agent or trustee." So far, I think that is enough, "or to accept any remuneration other than his stated charges for services rendered his clients;" my opinion is that that should be left out; and my opinion also and my urgent request of the Society is that you add no amendments at this time. The Board has given it full thought. It is an excellent product. Let it stand before you have ten more Codes of Ethics put into it.

FREDERIC MOLITOR, M. AM. SOC. C. E.—Mr. President and Gentlemen, I am in thorough agreement with Mr. Stuart's remarks on the subject of this last amendment, although I see in this last amendment a great deal of merit. As I understand it, the Board of Direction has

Discussion on Proposed Code of Ethics (continued).

prepared this Code of Ethics with, I dare say, a good deal of care; you have only heard one dissenting voice from the Board of Direction to-night against it.

I have had some little experience with the Code of Ethics of the Institute of Consulting Engineers. I am the Chairman of the Committee on the present Code of Ethics, and it seems to me, with the large membership of this Society, that the Board has prepared a Code that is quite natural, when you take into consideration the varied employments of its many members. Therefore, I hope, gentlemen, that you will vote down the last amendment, and any other amendment, and I trust that you will vote for the Code of Ethics as it has been prepared and submitted by the Board of Direction.

THE PRESIDENT.—Is there any further discussion of the amendment by Mr. Weller?

(Cries of "Question.")

Are you ready for the question? All in favor of adopting the amendment as proposed by Mr. Weller will say "aye"; opposed, "no". The motion is lost. The question is on the original motion. Is there any further discussion?

(Cries of "Question.")

HORACE ANDREWS, M. AM. SOC. C. E.—There is only one point I would call attention to, I do not know that it is possible to formulate a Code of Ethics to relate to all the various phases of the different engineers' relations to one another, but taking this as it is, there is one small change in the first section that I think might be put in: Instead of saying, "his stated charges," I would say "the charges fixed," because, Mr. President, as you mentioned this morning in your Address, from statistics prepared by the Secretary, a very large number of the engineers of this Society do not fix their own charges; they are fixed for them; and I suppose that the intention of this is that they shall not receive percentages of various kinds, as architects have been accused of receiving.

Instead of saying "his stated charges" it should read "the charges fixed." I think it would cover the ground a little better.

THE PRESIDENT.—Mr. Andrews, the chair is not quite clear as to exactly how you wish your amendment to read. I would ask you to reduce it to writing and submit it, so that it can be read.

MR. ANDREWS.—Merely to make that one change in the last line. For "his stated charges" I would say "the charges fixed" for services rendered.

THE PRESIDENT.—The Secretary will please read the change as it would read as amended by Mr. Andrews.

THE SECRETARY.—Mr. Andrews moves to amend the section to read:

"To act for his client otherwise than as a faithful agent or trustee, or to accept any remuneration other than the charges fixed for services rendered his clients."

THE PRESIDENT.—Has Mr. Andrews' motion a seconder? The chair hears no second.

A MEMBER.—I second the motion.

THE PRESIDENT.—Mr. Andrews' motion is seconded. Does any one wish to discuss it?

MR. HODGE.—I would like to know who fixes the charges? There are no fixed charges. We have no schedules of fees in this Society. I hope you will vote this down. The thing is impossible.

THE PRESIDENT.—Any further discussion of Mr. Andrews' amendment? All in favor of the amendment of Mr. Andrews will say "aye"; all opposed, "no". The amendment is lost. The question is on the original motion.

MR. THOMSON.—Mr. President and Gentlemen, I do not think any one is more anxious to lift up the profession than I am, in spite of what some of our discussers have stated, but, from all the discussion we have had to-night, I do not think we have a perfect Code of Ethics. I would be very glad to see a perfect code adopted, and I think the best thing we can do is to refer the whole matter back to the Board of Direction, in order that they can take advantage of any of these good suggestions that we have received, and not adopt an incomplete Code of Ethics.

A. W. BUEL, M. AM. SOC. C. E.—I second the motion.

MR. HODGE.—As a member of the Board of Direction, I want to say that the Board has worked two years on this question. To refer it back will not do any good. The Board of Direction has been working two years on this very imperfect code, and it is the very best it can do. If Mr. Thomson expects the Board of Direction to make anything perfect, he has a higher opinion of himself and his fellow-members than I have. I think it is right to back up the Board of Direction. They have given up two years to this, and they can revise it and improve it, as it goes along.

MR. STERN.—I move that Mr. Thomson's motion be laid on the table.

A MEMBER.—I second the motion.

THE PRESIDENT.—Are you ready for the question? All in favor of laying Mr. Thomson's motion on the table, please say "aye"; opposed, "no." The motion is tabled. The chair is of the opinion that a vote taken on this matter should involve its going to the entire membership by letter-ballot, and he thinks that a motion now to adopt it would not be binding, and therefore he would not like to entertain a motion to that effect. If that is the sentiment of the meeting, to submit the matter to letter-ballot——

Discussion on Proposed Code of Ethics (continued).

MR. HODGE.—On what basis do you say that this Annual Convention cannot do anything like this? It is not an amendment to the Constitution. This is a regular meeting. It seems to me that the meeting can take any action except to amend the Constitution. A letter-ballot in this Society is very unsatisfactory. I think the letter-ballot on the last amendments did not get half the membership to vote.* I do not see why we cannot take action, when this is not a constitutional amendment.

THE PRESIDENT.—Mr. Hodge may be right about the matter not being constitutional, and that is my statement of the case, not being constitutional, but our Constitution is not very well worded so as to take care of such questions as this, but it does appear to the chair that, as a matter of policy, it should go to letter-ballot. Of course, this meeting has control over the matter, and the chair will do whatever this meeting asks.

A. S. TUTTLE, M. AM. SOC. C. E.—I move that this question be submitted to the letter-ballot of the membership.

MR. HODGE.—The motion is out of order. There is a motion before the meeting. I move the question on the original motion.

THE PRESIDENT.—Gentlemen, you have heard the motion for a vote on the original motion. Are you ready for the question?

(Cries of "Question.")

A MEMBER.—I would like to hear the motion stated again.

THE PRESIDENT.—The motion is on these articles for adoption without submitting them to letter-ballot. The motion is for the adoption by this meeting of the American Society of this code without submission to letter-ballot.

A MEMBER.—I do not think this meeting can adopt such a motion as that. I do not think this meeting can bind the Society. I think it should be sent to letter-ballot.

THE PRESIDENT.—According to our Constitution, this meeting can bind us on this question. Mr. Hodge has raised that point, and the chair is ready to put Mr. Hodge's motion.

MR. TUTTLE.—I would like to make an amendment to this—Will you state the motion?

THE PRESIDENT.—The Secretary will read the original motion, which is on the six articles that we have under discussion.

THE SECRETARY.—I will read it as I understand it. It is that the American Society of Civil Engineers, on the recommendation of the Board of Direction, adopt the Code of Ethics which has been presented to it.

MR. OCKERSON.—I made that motion. That was not the motion that I stated, that this meeting should adopt the Cope of Ethics suggested by the Board of Direction. I would like to move an amend-

* The actual vote here referred to was 3 177 out of a total corporate membership of 6 312.

ment to this effect, that it is the sense of this meeting that the code should be adopted, and that it be referred to the membership for a vote by letter-ballot.

THE PRESIDENT.—Gentlemen, you have heard the motion.

MR. STERN.—I move that Mr. Ockerson's motion be laid on the table.

A MEMBER.—I second the motion.

THE PRESIDENT.—It is moved and seconded that Mr. Ockerson's motion be laid on the table. Are you ready for the question? All in favor of the motion will say "aye"; opposed, "no." The motion is lost. The question is on Mr. Ockerson's motion.

A MEMBER.—I second Mr. Ockerson's amendment.

THE PRESIDENT.—The amendment is to the effect that the clauses as presented by the Board of Direction be adopted by this meeting and submitted to letter-ballot of the membership. Are you ready for the question? All in favor of the amendment by Mr. Ockerson will say "aye"; all opposed, "no." The motion is carried, and the chair urges that it is not necessary to put the question of the original motion, as the amendment is carried.

MR. MOLITOR.—I should like to inquire whether a motion to the following effect would be in order now, that when this question of the Code of Ethics goes out to letter-ballot of the membership, that that letter-ballot be secret. Would such a motion be pertinent?

THE PRESIDENT.—Yes, sir, any motion——

MR. MOLITOR.—I make that motion, for this reason——

A MEMBER.—And that it be anonymous, too?

MR. MOLITOR.—Mr. President, in explanation of the motion that I make, that it be sent out as a secret ballot, I would say that it is because the last time the letter-ballot was asked for by the membership of this Society it was required, by the order of the officers of the Society or by the Board of Direction, that the ballot should be signed. I think it would be quite proper if my motion was seconded and put to the house and carried, that all ballots of this Society should be secret ballots hereafter.

A MEMBER.—I second that motion.

THE PRESIDENT.—Is there any discussion of Mr. Molitor's motion?

J. G. VAN HORNE, M. AM. SOC. C. E.—I think anybody who wants to vote on anything ought to sign his name to it.

J. WALDO SMITH, M. AM. SOC. C. E.—Ought there not to be a rule of the Board of Direction directing that all ballots come under the same order as the election of officers?

THE SECRETARY.—Mr. Smith asks whether there is not a rule at present of the Board of Direction which requires all ballots to be carried out as required by the Constitution in the matter of ballots for officers. Such a rule has been adopted.

Discussion on Proposed Code of Ethics (continued).

MR. SMITH.—That would cover this case.

THE SECRETARY.—It covers it entirely.

THE PRESIDENT.—That rule has been adopted by the Board of Direction, and the ballot would be secret. Mr. Molitor's motion, his suggestion, is already covered by action of the Board.

MR. STERN.—May I ask if that applies to all ballots that go out in future, no matter of what kind, that they must be secret?

THE PRESIDENT.—There is no provision in the Constitution or in the rules requiring a member to sign his ballot.

A MEMBER.—It never has been, but still we have been required to sign names to various ballots. I asked if in the future all ballots that go out will be secret ballots?

THE PRESIDENT.—The chair wishes to state that the matter of signing ballots has been merely by way of endeavor to secure a complete ballot, and, I think, to save postage.

THE SECRETARY.—I think it has been for the purpose of preventing members from disfranchising themselves, mostly, and also to save postage.

THE PRESIDENT.—In other words, if the people failed to sign their names on the outside it was expected that if they signed it on the inside, that they might not be disfranchised, and any action in the past which has tended to bring about the impression that there is a desire to prevent a secret ballot certainly was not intended by the Society.

THE SECRETARY.—I would like to state, further, if I may, that there never has been a ballot, so far as I know, that has not been secret.

C. B. SCOTT, ASSOC. M. AM. SOC. C. E.—Mr. President, I would like to ask if there was not a ballot recently, and that ballot was signed by the members, on the question of the adoption of an amendment to the Constitution, and I would like, furthermore, to ask when that rule was adopted that does not require members to sign their ballots?

THE PRESIDENT.—Mr. Scott is correct. The last ballot on constitutional amendments provided a place for the signing of the ballot itself, and also provided a place for the signing of the ballot on the outside of the envelope; and, subsequent to the counting of that ballot, which was done by the Board of Direction, which did the canvassing, the ballots were immediately destroyed. The entire Board was a committee for the canvassing, and the ballot was secret, notwithstanding the fact that nearly all the ballots were signed. The provision prohibiting the signing of ballots hereafter was adopted by the Board of Direction subsequent to the meeting.

MR. STERN.—I still ask for information. Are we required, will we be required, under that rule of the Board of Direction, or the rule adopted, to sign ballots for members of the Nominating Committee?

THE SECRETARY.—There are no such things as ballots for members of the Nominating Committee.

THE PRESIDENT.—What ballot do you refer to?

MR. STERN.—Members of the Nominating Committee. There are two ballots that can be so called, informal ballots.

THE SECRETARY.—There are no such things as ballots for the Nominating Committee. The Board of Direction has indicated certain rules by which suggestions are received for members of the Nominating Committee. It is essential that the name of the member voting should be known, because he can only vote for a member of the Nominating Committee coming from his district. It would be impossible to have a secret suggestion as to members of the Nominating Committee. The Board of Direction has recently ruled or adopted a resolution that hereafter the suggestions for the Nominating Committee shall be canvassed by the Board of Direction.

Ballot for Nominating Committee.

MR. STERN.—Mr. President, if that is the case, I would move the following resolution, if it is in order, that it is the sense of this meeting that all ballots in future for members of the Nominating Committee, whether informal or not, be secret letter-ballots, the signature to be signed only on the outside of the envelope; the details to be worked out by the Board of Direction. I make this motion, gentlemen, because I have heard a great deal of discussion among members, not only in New York, but elsewhere, as to the method of electing members of this most important of all our committees.

THE PRESIDENT.—There is no objection or reason why this meeting should not express its sentiments on this question, but the question itself involves a constitutional amendment, which this meeting should not pass.

MR. STERN.—I do not put it in the way of an amendment to the Constitution, but that it is the sense of the meeting. I think it is a question that ought to be threshed out now. If I have enough supporters, I think our views ought to be presented to the Board of Direction; if I have not enough supporters, the matter will be voted down.

THE PRESIDENT.—Is there any discussion of Mr. Stern's motion?

MR. SMITH.—It seems to me, as I understand the suggestion, that the ballots for members of the Nominating Committee shall be similar to those for officers of the Society. A man from one district could easily vote in another district, and the fact would not be known.

MR. STERN.—If a man who votes for a member of the Nominating Committee, instead of signing his name inside of the ballot, signs it on the outside, and it is checked up, that settles it.

MR. SMITH.—It might be blank on the inside. We do not know whether he has voted for members of his own or some other district.

Discussion on Ballot for Nominating Committee (continued).

MR. STERN.—That inside ballot could be marked one or two or three. That could not——

MR. SMITH.—How about the names on that ballot?

MR. STERN.—I see no practical difficulty in locating where the ballot comes from.

MR. SMITH.—But are the men in Districts Nos. 1 and 2——

MR. STERN.—In New York I think we vote in so many——

MR. VAN HORNE.—I cannot see why anybody should be ashamed to sign his name to anything he wants to vote for.

MR. MOLITOR.—Mr. President, I would like to answer the last speaker's inquiry by stating that there are about three thousand members of this Society who were either ashamed to sign their names to the ballot in January or February last, when the amendments to the Constitution were being voted upon, or else they did not vote through some careless motive. As I understand it, this subject is now brought up, that is to say, the question of the secret ballot, to see if we cannot get out a larger vote, if there should be any further amendments suggested in respect to the Constitution. Now, I personally, and I am sorry to say this here, but why should I not, in a public meeting of my brother engineers, why should I not say this, that at the time these amendments were proposed, I took quite an active part in urging the members to vote for the amendments to the Constitution, and I stand here and I am proud of that, even if we did not get enough votes, and in carrying on very considerable correspondence at that time with my former associates in the West and in foreign countries too, I got many, many inquiries in respect to these ballots. They came in this way, from young men, Associate Members of this Society. Young members say, why is it that these ballots go out, that we have to sign our names perhaps to earn us the onus of the officers of the Society, that we voted against them? Now, gentlemen, you may think that that is not so, but I have the correspondence to prove it.

Now, it seems to me that there are other gentlemen here who feel something like myself, and therefore it is not improper for me to rise and state what I believe is the reason this suggestion has been brought forward.

MR. SCOTT.—Mr. President and Gentlemen, that very matter occurred to me at the time when that ballot was sent out, and I was required to sign my name, as others were, to that ballot. I was not ashamed to do so; I was perfectly willing that my status should be known on that question of the adoption of the resolution, but if that is the case, why should we have a secret ballot for any purpose? The reason is simply this: While the man is not ashamed to let his status be known, at the same time it might be used injuriously to him in the future. That is the point; whether or not it will be

is a question. It is possible for a man to incur the ill will of men in authority in this Society. For that reason a ballot of that kind should in my opinion be secret.

LEWIS D. RIGHTS, M. AM. SOC. C. E.—I rise to a point of order. It seems to me, as I understand the motion made by Mr. Stern, that the two gentlemen who have just spoken are not speaking on the question. The question is on that of the Nominating Committee. As I understand it, we have already had action by resolution of the Board of Direction, so far as these general questions are concerned, but the motion, as I understand it, entirely relates to the Nominating Committee.

THE PRESIDENT.—The motion that is before the house is that it is the sentiment of this meeting that the ballots for nomination of officers hereafter be unsigned.

MR. STERN.—Members of the Nominating Committee.

MR. HODGE.—Members of the Nominating Committee be unsigned.

MR. STERN.—Be secret, the secret to be left to the Board of Direction.

THE PRESIDENT.—There is certainly nothing unconstitutional in our passing such a motion, if it is the sentiment of this meeting that it be passed.

MR. OCKERSON.—I would like to say that the members of the Nominating Committee are not selected by ballot, but they are selected at the Annual Meeting, from suggestions made by members of the separate districts. These are merely suggestions and not ballots.

A MEMBER.—I would like to be corrected if I am wrong, but it seems to me that what is before the house is the adoption of a resolution or the adoption of the Code of Ethics of the Board of Direction.

THE PRESIDENT.—The Code of Ethics has been adopted and will go to the members for letter-ballot. We are now discussing the question of a secret ballot, as to whether it is the sentiment of this meeting that suggestions for the nomination for members of the Nominating Committee be secret or open. Is there any further discussion on the motion?

MR. TUTTLE.—Did I understand that the question is as to whether the vote is to be secret or open? I was a member of the committee of the Board that made the last recommendation which was approved by the Board relative to the method of voting, and, as I recall it, the sense of the committee and the action taken by the Board was in the line of applying the provisions of the Constitution to all ballots, whether for the Nominating Committee, or for any other purpose whatever that a vote was taken; and the sense of that action was that the vote should be secret as far as possible.

Now, it is not practicable, as has been pointed out, to make it entirely a secret ballot, because the vote must show the district from

Discussion on Ballot for Nominating Committee (continued).

which it comes. That is a necessity which I think anybody can work out if he stops to think about it.

THE PRESIDENT.—Mr. Tuttle, the motion is that it is the sentiment of this meeting that suggestions for members of the Nominating Committee should be secret. This meeting has no power to amend the Constitution. Are you ready for the question?

(Cries of "Question.")

All in favor of the motion will say "aye"; opposed, "no". The motion is lost.

Division is called for. All in favor of the motion will please rise and be counted.

THE SECRETARY.—66.

THE PRESIDENT.—Be seated, gentlemen. All opposed will please rise and be counted.

THE SECRETARY.—68. We might take it over again, but that is the best I can do.

THE PRESIDENT.—The motion is lost by two votes. The chair ruled correctly.

A MEMBER.—Were the gentlemen standing in the lobby there counted in the first vote, as voting for it or against it?

THE PRESIDENT.—Those gentlemen were not considered as present.

THE SECRETARY.—Mr. President, the only thing I want to say about this matter is this, that the form of the ballot for the recent amendments to the Constitution was the form that has been in use for several years, and that there never was any objection to the signing of any ballot which related to amendments to the Constitution until it was raised quite recently. The only object really of making that a signed ballot was to prevent the disfranchisement of a number of careless members, who will not sign the outside envelope;* and there was no intention whatever of making it a public ballot in any way, or of depriving it of being a secret ballot, and, so far as I know, on any amendment to the Constitution, there has never been any knowledge of how any man voted.

THE PRESIDENT.—Is there any further business before the meeting? The Secretary has a communication to read.

The Secretary read the following report:

REPORT OF SECRETARY ON THIN PAPER FOR PUBLICATIONS

Report on Use of Thin Paper in Publications.

"Under date of April 18th, 1914, there was mailed to the membership of the Society, by order of the Board of Direction, a circular with a return form in order to enable the membership to state their preference as to the use of thin paper in the publications of the Society. While the circular requested a reply at as early a date as possible, it also asked that this date be not later than July 1st, 1914. Conse-

* The only secret form of ballot called for by the Constitution requires two envelopes, and this was abandoned in all other ballots on account of a ruling of the Post Office which practically doubled the postage in sending out ballots.—*Secretary.*

quently, the present report does not give the final figures in the matter, but it is believed that a sufficient number of members have replied to warrant a statement being made to the Convention in regard to it, especially as this will be the only time at which such a statement can be made until the first meeting in September next.

"The replies which have come in between April 21st and May 25th have been tabulated, with the following result:

3 127 replies have been received.
2 716 of these are in favor of the thin paper both for *Proceedings* and *Transactions.*
56 are in favor of the thin paper for *Proceedings* and against its use for *Transactions.*
240 are against the use of the thin paper in *Proceedings* and in favor of its use in *Transactions.*
11 vote *yes* for the use of thin paper in *Proceedings* and vote a blank as to its use in *Transactions.*
10 vote blank on the use of thin paper in *Proceedings* and vote in favor of its use in *Transactions.*

"Summing this up, and excluding the blanks, it appears that 2 783 out of the total vote of 3 117 (or about 90%) are in favor of the use of thin paper in the monthly *Proceedings,* and that 2 966 out of the total vote of 3 116 (or about 95%) are in favor of the use of thin paper in the *Transactions.*

"The comments made are quite voluminous and somewhat contradictory; for instance, one member says 'My eyes are too poor and brain not sufficiently developed to read both sides of the paper at once. Find leaves hard to turn unless finger is moistened. The question of being able to read a book without eye fatigue should take precedence of such items as bulk, weight, etc.' On the contrary, another member states 'The argument that the thin paper edition cannot be so easily read has no foundation. The lack of gloss and the clean tone of the paper are both conducive to good reading quality. I consider the Society publications in their present form the easiest on the eyes of anything I read.'

"There has not yet been time to read over and digest all the comments which have been made, but it is very clear that a very large majority of the membership is in favor of the present system. Many of those who replied state distinctly that they think it would be a step backward to go back to the heavier paper, and a great many emphasize the convenience to them in handling the *Proceedings,* stating that engineers frequently have little time for reading except while traveling, and that the monthly numbers of *Proceedings* can be carried in the pocket very conveniently.

"As to the *Transactions,* the number in favor of the present paper is still greater, the points that appeal to the membership being the great saving of shelf room, saving to individuals in the cost of binding, and the economy in time in the use of one index instead of four.

"In this connection, a number of opinions have been expressed that the last volume issued was too bulky, and that all the objects could be accomplished by the simultaneous publication of this volume in two parts. The only objection to this would appear to be the extra

Report on Use of Thin Paper (continued).

cost of binding, which the members who have expressed this opinion are quite willing to assume.

"A number have suggested that the half-tone illustrations be printed on heavier and glossed paper, and inserted.

"This report is made simply for the general information of the membership, as the matter has not been brought to the attention of the Board of Direction.

"CHAS. WARREN HUNT,
"Secretary."

"MAY 26TH, 1914.

Announcements.

THE SECRETARY.—I have a few announcements to make, Mr. President. I have to announce that Robert A. Cummings, M. Am. Soc. C. E., has been appointed to fill the vacancy on the Board of Direction caused by the death of Emil Gerber, Director, Am. Soc. C. E.

That Rudolph P. Miller, M. Am. Soc. C. E., has been appointed a member of the Special Committee on Steel Columns and Struts, to fill the vacancy caused by the death of Emil Gerber.

That C. G. E. Larsson, M. Am. Soc. C. E., has been appointed a member of the Special Committee to Report on Stresses in Railroad Track, to fill the vacancy caused by the death of Emil Gerber.

That Nelson P. Lewis, M. Am. Soc. C. E., has been appointed Chairman of the Special Committee to Investigate Conditions of Employment of, and Compensation of, Civil Engineers, to fill the vacancy caused by the death of Alfred Noble, Past-President, Am. Soc. C. E.

That Charles S. Churchill, William J. Wilgus, and Henry E. Riggs, Members, Am. Soc. C. E., have been appointed as members of the Special Committee on Valuation of Public Utilities. (Alfred Noble and Thomas H. Johnson, now deceased, were members of this Committee.)

I have to announce the retirement of H. M. Byllesby, M. Am. Soc. C. E., as a member of the Special Committee on Valuation of Public Utilities.

I have to announce that President McDonald has appointed William L. Saunders and Chas. Warren Hunt, Members, Am. Soc. C. E., as members of the Reception Committee from the American Society of Civil Engineers, to receive Foreign Engineers attending the International Engineering Congress in San Francisco in September, 1915. (Each of the other National Societies has also made appointments on this Reception Committee.)

I have also to announce the following deaths:

Deaths.

JAMES JOSEPH FERRIS, of Jersey City, N. J., elected Associate, July 10th, 1907; Member, September 3d, 1912; died May 15th, 1914.

RALPH ALBREE, of Pittsburgh, Pa., elected Junior, October 4th, 1898; Associate Member, October 1st, 1902; died February 16th, 1914.

HORACE ARTHUR COOK, of Phœnix, Ariz., elected Associate Member, May 3d, 1910; died May 17th, 1914.

Announcements.

I am requested by the Local Committee to announce that special street cars, to convey those who are going on the trip to Annapolis to-morrow, Wednesday morning, will leave the corner of Charles and Chase Streets at 9.30 A. M. All are requested to be on the corner promptly at that hour, 9.30, as there is no storage space for the cars, and it is impossible to hold them.

MR. STUART.—Mr. President, I would explain that the corner of Charles and Chase Streets is right at the corner of this hotel, and if you do not catch these special cars you will have to make two transfers.

THE SECRETARY.—The President asks me to announce that there will be a meeting of the Board of Direction of the Society directly after the adjournment of the meeting in this hall, and that all members of the Board will wait here until everybody else has gone out.

Report of Special Committee on Flood Prevention.

THE PRESIDENT.—We had a very important subject on the programme to-night that was overlooked, the Progress Report of the Special Committee on Flood Prevention. I hope the members will be seated and hear the report.

I introduce C. McD. Townsend, M. Am. Soc. C. E., Chairman of the Special Committee on Flood Prevention. Those gentlemen who do not wish to hear the report will kindly retire from the hall and let those who do hear it.

Col. Townsend presented the following report:

"PROGRESS REPORT OF SPECIAL COMMITTEE ON FLOODS, FLOOD PREVENTION, AND ALLIED SUBJECTS.

"Annual Convention at Baltimore, Md., June 2d, 1914.

"The recent floods of exceptional magnitude, which in several instances became serious calamities, have made the entire Nation alive to the necessity of action looking toward flood prevention. Due to unavoidable delays in the organization of the Committee, it has only been practicable to prepare for this meeting a progress report outlining in general the proposed scope of the Committee's investigations.

"It is not expected that any universal solution for the prevention of floods and the mitigation of attendant disasters can be formulated. Furthermore, it is believed that, however earnestly conclusions are now desired, a period of investigation is absolutely necessary, and that, before the Committee can present its final report, it must devote its efforts to the compilation of fundamental data.

"There is much information to be collected, in this and other countries, relating to the frequency and magnitude of floods and to the seriousness of the losses resulting therefrom. Consideration should also be given to the obstruction of natural flood plains which have resulted from community growth on river banks, and from other activities.

Report on Flood Prevention (continued).

"The subject of flood prevention is a broad one, closely allied to the general question of stream regulation. It is therefore deemed advisable to emphasize certain definite phases of the problem with special reference to the relation which run-off and the maximum stream flow bear to rainfall intensity and distribution, and, in this connection, to give attention to such vital questions as the effect of forests and of storage reservoirs upon run-off and maximum stream discharge.

"The Committee appreciates the value of uniform, accurate, and continuous records, and desires to call attention to the insufficiency of data heretofore collected relating to stream flow, particularly under flood conditions. Data of this character should be systematically collected by Federal and State agencies. While commending what has already been done along these lines, the Committee believes that more ample provision should be made for the observation and study of floods during their occurrence.

"The Engineer of to-day is in urgent need of the data relating to the floods of the past, but in many cases the opportunity to obtain these data has been forever lost. Fifty years hence, the data of to-day will be no less essential.

"Your Committee feels that the profession should keep in touch with legislation affecting stream regulation and flood control. It is therefore proposed to review the work now being done in the several States relating to floods and allied problems, and to co-operate with the Society's Special Committee on Water Laws.

"As the members of the Committee live in widely separated sections of the country, making it impracticable for all, or even a majority of them, to meet with any degree of frequency, several sub-committees have been appointed to take charge of the work in their respective localities.

"These sub-committees are as follows:

"On Rivers emptying into the Atlantic Ocean: John A. Bensel, Arthur T. Safford, and Charles Saville.

"Ohio River and Tributaries: John A. Ockerson, Morris Knowles, and Daniel W. Mead.

"Rivers emptying into the Gulf of Mexico: C. McD. Townsend, T. G. Dabney, and Frank M. Kerr.

"Rivers emptying into the Pacific Ocean: C. E. Grunsky, J. B. Lippincott, and F. L. Sellew.

"Other sub-committees will be appointed as occasion may show to be desirable, to take charge of special work.

"Your Committee hopes to be able to report substantial progress at the Annual Meeting in January, 1915.

"For the Committee,

"C. McD. Townsend,

"Chairman."

Adjourned.

The President.—Has any other member any business to bring before the convention? If not, we will stand adjourned, and the Board of Direction is requested to assemble immediately after adjournment.

THIRD SESSION.

Third Session Called to Order.

Thursday, June 4th, 1914.—The meeting was called to order at 10 A. M.; President Hunter McDonald in the chair; Charles Warren Hunt, Secretary; and present, also, about 250 members and guests.

THE PRESIDENT.—The meeting will please come to order. Before taking up the printed programme, we have extended to Mr. W. A. Cattell, of San Francisco, an opportunity to address the Convention on the subject of the "International Engineering Congress", to be held at the Panama-Pacific Exposition next year. Mr. Cattell will explain what the Engineering Congress is, and endeavor to give the membership of the Society a little better idea as to its objects, and what we should do to aid it.

Address by W. A. Cattell.

W. A. CATTELL, M. AM. SOC. C. E.—Mr. President, and Gentlemen, when it was determined that an International Exposition would be held in San Francisco in 1915 to celebrate the opening of the Panama Canal, the engineers on the Pacific Coast thought it would be eminently proper to hold at that time an International Engineering Congress, to which engineers throughout the world would be invited, and, after a good deal of preliminary work and a number of meetings of the engineering and technical societies of the United States, it was finally determined that the Congress should be held under the auspices of the five National American engineering societies: the American Society of Civil Engineers, the Mechanical Engineers, the Mining Engineers, the Electrical Engineers, and the Society of Naval Architects and Marine Engineers—five societies.

In order to inaugurate this movement, and to secure the co-operation of the five societies, it was thought advisable that the engineers on the Pacific Coast, to show their good will in the matter, and their faith in it, should become subscribers to a considerable fund; so they raised a fund there of $10 000 toward the expenses of the Congress. The other five societies then contributed amounts in proportion to their membership; so that, altogether, there was a guaranteed fund of about $34 000.

The Congress is managed by a Committee of Management consisting of 28 men, 10 of them are the presidents and secretaries of the five societies, and the other 18 members are appointed from among the local members of the societies in and about San Francisco. This Committee has divided up the work of the Congress among various sub-committees, and it is proposed to make the *Transactions* of this Congress an important and valuable feature. There will be ten volumes of *Transactions* published: The first will be on "The Panama Canal"; the second volume will be on "Waterways and Irrigation"; the third on "Municipal Engineering"; fourth, "Railways and Railway Engineering"; fifth, "Materials in Engineering Construc-

Address by Mr. Cattell (continued).

tion"; sixth, "Mechanical Engineering"; seventh, "Electrical and Mechanical Engineering"; eighth, "Mining Engineering"; ninth, "Mining Engineering and Naval Architecture"; and the tenth, "Military Engineering", with some miscellaneous items in it.

The official invitations were issued practically to all the engineering and technical societies whose existence could be found noted throughout the world. I do not remember the exact number, but I think there are three hundred different societies that have been officially invited to participate in the Congress. We obtained the membership lists of those societies, and have sent out 147 000 circular letters inviting the different members to participate in the Congress and to become members. The general membership fee in the Congress has been fixed at $5, and this entitles each member to all the privileges of the Congress, and to the general volumes of the index, which will also give a synopsis of the papers, and to one other volume, which he may select. The other volumes, if he desires, are to be paid for separately, and the total price of all the *Transactions* will be $27.50 bound in paper, or $30 in cloth; that is, $25 in addition to the membership fee of $5.

Responses to these invitations have been very gratifying in a way, but we feel that the engineers of this country are not responding as we would like to have them. We have already enrolled about 1 600 members of the Congress, about 1 100 of them from the United States and Canada, and about 500 from foreign countries. I have talked with quite a number here at the Convention, and find that they have never received any of the circular letters which have been sent out. Now, those have been sent out quite carefully, and we feel that it is perhaps because they have been in the form of a circular that they have not been opened or read; but we wish the engineers of this country to take a decided interest in this Congress, and, if they have not already subscribed, to send in their subscriptions.

We believe these *Transactions* are going to be of value. We have departed somewhat from the usual practice in preparing these papers. The whole field has been divided into different branches, and each has been sub-divided into a number of topics and a number of papers, and the Committee has prepared a syllabus of each paper, to prevent overlapping in each field, and to define clearly what was the limit. It is proposed to make each paper a general review of engineering, and of that particular branch of the department in the past decade, to indicate clearly the best practice of that kind, and also to give some intimation of possible future developments.

We will have such papers on American practice, on English and perhaps Continental practice, where there is a marked difference, and we will have some committee appointed to have those papers on the

same topics from different countries co-ordinated, and compared by some one of international experience and reputation.

I think that a great number of our engineers here have simply put this matter aside as something that is not urgent, and that they will attend to it after awhile; but we wish they would show their appreciation of the Congress by sending in their subscriptions at as early a date as possible, and also would make the general features of the Congress known to any of those who are not members of this or any other technical society, but who may be interested in it. There are no requirements. Any one interested in it may become a member of the Congress by paying the fee of $5.

THE PRESIDENT.—Up to about ten years ago, the City of Baltimore was celebrated principally for its pretty girls, its good things to eat, and its cobble-stone streets. They have had an awakening since the fire, and are now engaged in a great many activities in which engineers are particularly interested. Our programme to-day consists of a visit to the various engineering features, and, prior to this visit, it has been arranged that representative engineers, in charge of each of these departments, address this meeting. The first gentleman on the programme is Mr. R. K. Compton, Chief Engineer of the Paving Commission. We would be glad to hear from Mr. Compton.

Address by R. K. Compton.

R. KEITH COMPTON, M. AM. SOC. C. E.—Mr. President, Ladies and Gentlemen, it is true that until a few years ago we had a national reputation, and indeed an international reputation, for fine looking women, for our monuments, and for our cobble-stones. We are proud of the ladies, indeed; we were proud of the monuments, but we were not proud of the cobble-stones. In the brief time allotted me, I will endeavor to put before you the vast paving scheme which the City of Baltimore has undertaken.

Although Chairman of the Committee on City Planning, Parks, and Paving, I shall only deal with paving, leaving the other matters to be described later by my aids on the Committee, who are in direct charge of the respective works.

On December 31st, 1911, this city had on its hands 350 miles of cobble-stone streets and alleys, aggregating 5 000 000 sq. yd., which, if divided into a roadway 18 ft. wide, would equal twelve times the distance between here and Washington, D. C. Our citizens suddenly awoke to this fact, at the municipal election in the spring of 1911, and overwhelmingly passed two paving loans, one of $5 000 000, to be expended in paving generally, and the other, of $2 500 000, to be expended exclusively in the annex section of the city for the improvement, primarily, of unpaved streets and roads, which would enable the Appeal Tax Court immediately to relist the property abutting thereon from the rural rate to the full city rate, which will be described in detail later by Mr. McKinney, Chief Engineer of the

Address by Mr. Compton (continued).

Commissioners for Opening Streets. These loans had previously been authorized by the Legislature, sessions of 1908 and 1910, but the Enabling Act contained a clause prohibiting the construction of improved pavements under these loans until all sewers, both sanitary and storm-water, had been completed. This was a very wise provision, and as we had to allow all the sewers to be constructed in advance of the paving, naturally our paving operations were somewhat delayed and somewhat interfered with as a general scheme.

The Paving Commission of the City of Baltimore was appointed and organized immediately after the passage of the loan, that is, in May, 1911. Of course the $7 500 000, as produced by the loans, was merely a working capital, every one realizing that it would take a vastly greater amount to eliminate completely the cobble-stone streets and alleys in this city. One of the first acts of the Commission, therefore, was to prepare an estimate showing what it would cost to eliminate completely the cobble-stone streets and alleys over the entire city. All this old-style paving being in what is known as the old section of the city, it was found that it would take about $10 000 000 to pave this section completely, it being understood that the $5 000 000 loan was only available in this section as a working capital; in other words, it would take about $5 000 000 in addition to the two loans of $7 500 000, or a total of $12 500 000, to pave the City of Baltimore completely, from one end to the other, including streets and alleys. How to raise the additional $5 000 000 was the next question.

Previous to 1911, about 2 500 000 sq. yd. of improved paving had been laid, portions on the assessment plan, in whole or in part, and portions out of the general fund or Tax Levy.

The Commission first considered the assessment plan, but a citizen, Mr. "A", residing on a street to be paved by the Commission, awoke to the fact that Mr. "B" had his street paved for nothing about 20 years ago; therefore why should it cost him anything now? Therefore it occurred to the Commission that the first thing to do was to equalize the system in some way; in other words, to go back and endeavor to make Mr. "B", who had his street paved out of the general fund many years ago, pay for his portion at this late date. Therefore, we instituted what is known as the "Paving Tax", which is applicable to all improved paving, above the grade of cobble-stones, laid by the city at no expense to the property owner, but out of the general fund, no matter when it was constructed, as well as to the streets now being paved. Briefly stated, it is about as follows:

The streets are classified, as to widths between curbs, as "A", "B" and "C", with rates per front foot per year for a period of 10 years, of 15, 10, and 5 cents, respectively, regardless of the class of improved paving. Certain concessions are allowed to corner property, portions of the side being free, whether residential or otherwise.

By the application of this tax in the streets already paved and those to be paved, we will be able to raise from $4 000 000 to $5 000 000 additional to the loans, and by that means it is our intention to pave the City of Baltimore so that she will take her just rank among the American municipalities.

In tabulating the estimate, the Commission had in mind the placing of improved granite block on heavy-traffic streets, vitrified block on medium-traffic streets, sheet-asphalt on light, and bituminous concrete (Topeka specifications) on exceedingly light traffic streets, all on a concrete base. All streets and alleys 30 ft. between curbs and less, the Commission proposed to pave with vitrified block. This plan has been followed very closely in our actual operations, except that sheet-asphalt has been put on some streets of rather heavy traffic, where the elimination of noise was quite a factor.

An attempt was made at first to utilize the old cobble-stone surfaces on light-traffic streets, as a base, and re-surface this with sheet material. This plan was soon discontinued, however, as it was not found to be economical, owing to the fact that the streets had been previously dug up to a large extent for the construction of sewers, water, and gas pipes, etc.

In all our present work, the cobbles are removed and, in convenient crushers placed by the contractors, are crushed and used in the concrete base.

The city maintains its own laboratory, where all materials, such as asphaltic cements, Portland cement, vitrified block, etc., are tested, so that the municipality is assured that it obtains the proper materials in accordance with the specifications.

There are five asphalt plants now in operation in this city, and fifteen general contractors are engaged on all classes of paving work. Inspectors are placed at the plants, as well as on the street, to see that the materials are proportioned, mixed, and sent to the street in the proper manner.

Laboratory tests are drawn from both plant and street, and the proper tests are made to see whether or not they conform to the specifications.

Up to December 31st, 1911, there were about 151 miles of improved paving in this city, aggregating about 2 657 000 sq. yd. From December 31st, 1911, to December 31st, 1913, the following pavements have been constructed: 1 288 000 sq. yd, or 73.0 miles, or a total of 3 945 000 sq. yd. = 224 miles now paved. The total city mileage is 556.67, and the total mileage to be paved is 332.67.

At the present time we have under contract about 50 miles, the contracts running from $5 000 to $300 000, and amounting in total to $2 500 000.

Address by Mr. Compton (continued).

It is this work which we propose to show you, gentlemen, this afternoon. The machines will be ready for you at this hotel at 2.15 P. M., sharp, marked "City Planning, Parks, and Paving."

I cordially invite you all to come on our excursion this afternoon. You need not be disturbed by this rain. It will not last. It is all arranged to be turned off one minute before the excursion starts.

THE PRESIDENT.—I suspected all the time that the weather was entirely under control, but I did not know its source until a few moments ago. The next speaker on the programme is Major Joseph W. Shirley, Chief Engineer of the Topographical Survey of the City.

Address by Maj. Joseph W. Shirley.

MAJ. JOSEPH W. SHIRLEY.—Mr. President, Ladies and Gentlemen, the department which I have the pleasure to represent is one that probably appeals to some engineers, but, up to the present time, I am afraid that, to a great many it does not appeal to the extent which we would like. I know it does not now appeal to a great number of citizens, to whom we would like it to appeal. I refer to the subject of City Planning.

City Planning, up to a few years ago, was considered by a great many as a lot of fanciful dreams and pretty schemes, on paper, which probably would never be realized; the engineer, as a rule, looked at it in a way as: "That is all very nice, but we want to do something."

Now, during the last 5 or 6 years, that subject has taken a step forward, and this has been very gratifying to all who have been at all interested in it; and Baltimore, although it probably has not a great many big schemes on paper, or fine drawings, to show you, of magnificent boulevards, and other designs, has, nevertheless, been working along a line which we think has been in a common-sense sort of way.

We feel, here in Baltimore, as a great many other people have felt, that, although a great deal of time and attention has been given to designing buildings, to designing railroads, and to designing all other works of man, the biggest thing that probably ever was built, and probably ever will be built, is a city, and there has been less designing along that line than on any of the building lines; but we have awakened to the fact that the city is a place for people to live in; and when people are living in a place they want all the conveniences, they want all the happiness, they want everything they can possibly get out of it. That takes us into the matter of street paving, sewer construction, water supply, parks, housing conditions, and all such matters.

In 1888 Baltimore annexed quite a territory. The city, as you know, is a very congested one; the houses are close together. We have a great many people per acre, and so, before starting any development of that new area, it was thought best to make a complete and careful survey of it. This survey was made, and very carefully made, and, I think, at the time it was completed it was probably as good as, if not better than, any similar survey that has been made in this country.

I think a great many other cities have profited by some of the results which were found here, and it now seems to be a very much more common practice for cities to work out a good map showing the existing conditions before planning other improvements.

Based on this map, our department—the Topographical Survey Commission—was directed to prepare a street plan, in which the people were to co-operate, and to try to work out a system which for the future would be very much better than some of the systems that were worked out in years past. In this as well as every other city, many dollars have been spent to rectify conditions that could have been taken care of when the land was cheap, and when the buildings were scarce, and the opportunity offered.

Baltimore was laid out originally in about 1729, and comprised about 60 acres. The roads leading from the surrounding country ran into the city in a way that almost formed the city as a hub; these old roads have been used as a basis for the future street development. Just as soon as the city awakened to the fact that they really were to be used, and that they were going to be important, an effort was made—and it succeeded well, I think, in a good many respects—to widen those roads, and to change their grades so that we could have at least a certain number of wide thoroughfares, on easy grades, to enable the people from all sections to reach the heart of the city without any more discomfort or delay than that absolutely necessary.

Now, when we compare some of the work that we have done here with that done in other cities, we do not exactly feel proud of the fact that our streets, or a great many of them, are not as wide, and probably not as elaborate, as those in many other cities, but I think that there we are making a mistake, that is, that we have not as yet fully appreciated the importance of wide thoroughfares. We cannot look forward 100 or 150 years, to a time when we know that these streets are going to be crowded, even though at the present time there may be plenty of room on them; and that is one of the hard things that we have to contend with in our present schemes, to get the people to back up a scheme that looks so far into the future.

This afternoon we hope, in connection with our trip around town, to show you a few streets that are laid out and are to be used as main thoroughfares. I think you will find, by the map hanging in the lobby, if you examine it, that what I have said as to the streets leading from the center is true.

The city has a planning department which works in very close contact with the Park Department, and has worked out a system of park boulevards in connection with the park system. Our park system has developed admirably in the last 10 years, and when we have our parks properly connected, we feel that, then, we shall have a system to which we can point with a pardonable degree of pride.

A great deal of our undeveloped territory is admirably adapted

Address by Maj. Shirley (continued).

for park purposes, for the very property that is least valuable to the property owner, or the land developer, is, as a rule, the most valuable for park purposes. The Sewerage Department, the Water Department, and all the other departments connected with the city, which are engaged in the upbuilding of the town, have been working in harmony with the general plan; and, as I say, although we may not have as elaborate a scheme as some cities, we feel, at the same time, that we have accomplished quite a good deal, and that what we have done has been in the right direction.

Chief among our many troubles—and there are most probably engineers connected with municipal departments now present who have had the same trouble—is to get the citizens themselves interested, so that we hope that engineers connected with city governments, as well as those engaged in other branches of work, will use their good offices and influence to spread abroad the necessity for a civic plan for each town.

Your hardest proposition will be, as we have found it, the handling of the real estate developments. Every real estate man, every man who owns a piece of ground, naturally is interested in getting the greatest number of "front feet" out of it that he can, and it takes lots of persuasion and lots of nice talk—and sometimes lots of other kinds of talk—to get them to view the matter as the city sees it; but, if the departments hold together, as they do in Baltimore, the real estate man gradually comes to feel that it is to his advantage to fall in with the general plan and work in harmony with the city departments, rather than to try to foist on the city something that the city does not want.

So we hope, as Mr. Compton says, that this rain will stop at the appointed time, and will not slop over and make a mistake, and that those who are going on this trip will have an opportunity to get a general idea of what Baltimore has been doing along the line of city planning.

THE PRESIDENT.—The next speaker is Mr. F. W. McKinney, Chief Engineer of the Commission for the Opening of Streets. We shall be glad to hear from Mr. McKinney.

Address by F. W. McKinney.

F. W. MCKINNEY, ASSOC. M. AM. SOC. C. E.—Mr. President, Ladies and Gentlemen, the Commissioners for Opening Streets—which Commissioners constitute the Annex Improvement Commission—open streets both legally and physically. The legal opening of the streets usually entails condemnation proceedings, together with the assessment of benefits and the awarding of damages. In their capacity as street openers, the Commissioners operate in all parts of the city; as the Annex Improvement Commission, they grade, curb, and pave streets in the Annex part of the city, which is about one and a half times the area of the old original city of Baltimore.

The funds for paving in the annexed district are provided for by loans, there having been authorized, since the constitution of the Commission in 1905, loans to the extent of $4 500 000. At the end of this year we will have spent about $3 500 000 of this amount, which will leave us about two years' supply of funds, as the Acts which authorized these loans provide that not more than $500 000 shall be spent each year.

In looking over the paving in the Annex, which is very large in area, and is largely undeveloped, the first question that arises is, how is it determined which streets are to be paved? Now, a complete answer to that question would be very complicated. The first thing taken into consideration is that of revenue. Revenue is necessary. Our system of taxation in the Annex is such that property that is not located on a paved street pays only one-third the full city rate of taxation. If the property is located on a street that has an improved pavement, this pavement leading to a main thoroughfare, the property is assessed at two-thirds the full city rate of taxation. When a block of property of not more than 200 000 sq. ft. is surrounded by improved paving, it pays the full city rate of taxation.

Through this change in the rate of taxation, the money that was spent by the Commissioners last year for paving streets in the Annex yields at present between 16 and 17% on the investment. It is quite a profitable investment; and, in finding out what streets should be paved, that question of income has quite a little influence. At the same time, the future development of the city is not at all overlooked. As you will see when you go out this afternoon, we have a very efficient Topographical Survey Commission, City Planning Commission, and Park Board. The Commissioners for Opening Streets and the Annex Improvement Commission at all times work in hearty cooperation with these departments, and their recommendations as to the construction of boulevards and of streets through unimproved property, which are built in order that various centers of activity in the outskirts of the town may be connected, are usually accepted; and we pave, in general, along the lines as suggested by these departments.

Since the Commissioners started their paving work in 1906, they have laid about 885 000 sq. yd. of improved paving. Since January 1st, 1914, we have laid about 2½ miles of paving based on a width of 30 ft. between curb lines. That 885 000 yd. paved since 1906 amounts to about 50 miles of streets 30 ft. wide between curbs. With the work under construction at the present time we expect to complete during 1914 180 000 sq. yd., which will amount to about 10 miles of streets.

One big difference between the paving operations in the Annex, and ordinary city paving is the large quantity of grading that we have to do. A great number of our streets are built through virgin territory. They go through corn fields and forests; we cut through hills and fill up ravines. Since January 1st we have handled about 95 000

cu. yd. of grading, and this will be tripled before the end of the year.

I hope that I will have the pleasure of visiting some of this work with a number of you this afternoon.

THE PRESIDENT.—The next speaker this afternoon is Mr. O. F. Lackey, Chief Engineer of the Harbor Board.

Address by O. F. Lackey.

O. F. LACKEY, M. AM. SOC. C. E.—Mr. President, and members of the Society, to give you an idea of the excellent reputation that I have as a local speaker, the Local Committee met me in the lobby, and requested that I please confine my remarks to one minute.

The municipality of Baltimore started in 1904 to take some active interest in the development of the harbor. Since that time we have spent about $7 000 000 in the construction of the piers, and we have now about completed, or will complete about the end of the month, another pier, making the ninth, costing about $1 000 000.

In addition, we have been opening a water-front street around the side of the harbor. The first section has been completed, and the second section has been begun. The cost of that improvement will be about $3 000 000.

There is so much to be said in reference to the harbor of Baltimore, and there is so much to be seen, and there are so many here who are perhaps not directly interested in the work, that I think it would be better for me to wait until we have you aboard the boat this afternoon at 1.30, at which time it will give me great pleasure to go into the details of construction, or into any other features of the work in which you may be interested.

I want to state that on our trip you will be given what is known as the Maryland crab steamed. There will be no limit to the supply of them, and other refreshments will be provided, but those of you who come from the Middle West or from the Northern States, who know nothing about Maryland crabs, certainly do not want to miss this opportunity of getting introduced.

THE PRESIDENT.—The next speaker is Mr. Calvin W. Hendrick, Chief Engineer of the Sewerage Commission. We will be glad to hear from Mr. Hendrick.

Address by Calvin W. Hendrick.

CALVIN W. HENDRICK, M. AM. SOC. C. E.—Mr. President and Ladies and Fellow-Members, I believe I am to make a few remarks covering the outline of our trip to-day, and to give a brief description of the Baltimore sewerage. As you all probably know, Baltimore, up to a few years ago, was in the unique position of being the only city in the country that had no sewerage system. They depended on what you might say were cess-pools and surface drainage, the toilets draining into the cess-pools in the back yards, and the kitchen sinks and the wash-tubs draining into the gutters, and thence to the nearest stream. They had probably 40 miles of old storm-water drains in the central portion of the city, and not in any way connected up.

They required very large catch-basins, so large that children have been drowned by being washed into them. In other words, the city was in a very unique position.

The question of sewerage had been discussed probably for 50 years. Nothing definite had come of it, until about 1894. In that year the Legislature passed an Enabling Act requiring that sewage, before being discharged into Chesapeake Bay, should be treated. That, of course, necessitated the adoption of two systems of sewers, one for sewage and one for surface drainage. It was not desirable to attempt to purify the rain water. Therefore, we wanted to reduce the quantity of sewage. That meant the design of a sanitary system and a storm-water system.

The next question was to take the sewage to the disposal plant with as little pumping as possible, that is, by gravity, which resulted in our designing the high-level interceptor, which hugs the hills, as near to the Basin as possible.

As you know, Baltimore sits in a sort of amphitheatre, with the hill sloping toward the harbor. The disposal plant is on Back River, about 14 miles from its entrance into Chesapeake Bay. After establishing the disposal plant, we backed the grade of our outfall sewer up to the city, hugging the hills, and keeping as near to the harbor as possible, until we terminated in Forest Park, a distance of about 13 miles from the disposal plant. That enabled us to intercept about two-thirds of the sewage, and carry it off by gravity; the other third, flowing to the harbor, was intercepted by two other sewers, flowing by gravity to the pumping station on Jones Falls near the Basin, at which point the pumps forced the sewage about 1 mile through 42-in. force mains, lifting it a height of 72 ft., exclusive of friction. That meant that the sewage from one-third of the city had to be pumped.

After carrying the sewage to Back River, it passed through a system of purification, which I trust I will have the pleasure of showing you on the ground. It can be shown better than explained.

Some of the peculiarities about the construction of the Baltimore sewers are: very steep grades; a large stream running through the eastern part of the city, called Gwynns Falls; another running through the western part of the city; the tunnels of the Baltimore and Ohio and the Pennsylvania Railroads, both passing under the city. Thus there are two railroad tunnels, two streams, very steep grades, and a large flat area around the basin in which the sewers will be below tide level, all of which complicates matters, as we were anxious not to get any salt water into the disposal plant, which meant that our large low-level interceptors had to be water-proofed.

Another peculiarity about the Baltimore sewerage construction, in addition to those mentioned, was that, during the last few years, people have been building private sewers. Take this hotel, for instance: they would get a franchise from the city to build a sewer down to Jones Falls,

Address by Mr. Hendrick (continued).

a couple of thousand feet. This sewer belonged to the hotel building it. The person building such a sewer could sell the right to cut into it at so much a tap, and in that way, a large number of private sewers have been laid.

In building our sewers, we were not allowed to intercept any of the sewage until we were ready to purify it, meaning that we had to maintain all these private sewers during the construction of our sewers, holding them in place. Sometimes we found as many as twelve private sewers in one street, and these had to be maintained.

As a rule, in other cities, the city lays a sewer in the center of the street, and the property owners bring their connections to the sewers. In the case of the Baltimore sewers, we not only lay the sewer in the center of the street, but we carry it through the wall of the building in front, and to the fence in the alley. If a party has a connection in the house, he wants the sewer connection brought to that connection, in order to save every cent. All these things have brought about peculiar conditions.

We have laid between 500 and 600 miles of sewers and drains, up to the present time. Our pumping station has been in operation for a couple of years. Of course, when we first started, we had to go through the process of connecting up one house and two houses and three houses, and so on; although our outfall sewer was designed to take care of a million people, we had to make a beginning, which caused a difficult problem until we reached a point where the flow was sufficient to take care of itself.

We have now between 35 000 and 40 000 houses connected, and about 20 000 additional houses ready to connect. The main features of the work have resolved themselves into: First, the design and construction of sewers under the beds of the streets; second, the pumping proposition; third, the disposal plant; and fourth, the storm-water drainage. That, of course, has its interesting features, having two systems crossing and re-crossing one another in thousands of different places, requiring careful study to make them fit in.

In some places we had a 9-ft. storm-water drain intersecting a 12-ft. sewer at the same grade. To make a siphon of that size work involves large questions for careful consideration. For instance, a siphon that is able to take care of a 9-ft. sewer must be ready to take care of a run-off that would fill a 9-ft. drain. It must also take the dry-weather flow, which may require only a 15-in. pipe, as there is danger of the siphon choking up. In this case we made a battery of three pipes. The smallest was designed to take care of the dry-weather flow, keeping it under pressure. As the storm increased and the small pipe was unable to take care of the flow, it overflowed a dam, putting the second pipe into commission, and when these two were overtaxed, the water rose still higher, putting the third pipe under pressure, thus keeping

them all under pressure and cleaned out. As the rain ceased, they were put out of commission in the reverse order.

One of the most interesting parts of the work is the covering of Jones Falls. The stream goes through the city and terminates down at the docks, near Market Place. It drains about 50 sq. miles to the north, and has a very heavy run-off. This causes the water to rise very suddenly at times, and overflow, especially in the lower section of the city where the surface of the adjoining property is as low as the bed of the stream.

Retaining walls were built along this stream, but the old storm-water drains were allowed to drain into the Falls near the bottom, so that, when the floods came, the water would back out through these drains and flood the low district.

We have now taken care of this low territory by building an intercepting drain outside and paralleling the Falls, so that none of these low drains enters it, thus making it a separate proposition from the covered Falls.

In covering the Falls, two problems came up and had to receive consideration. One was the dry-weather flow and the other was the bridges crossing the stream. These bridges had established grade crossings. Of course, we did not want to lift the bridges, thus making the grades steeper on each side. They were already steep enough. So, in place of throwing one span across, necessitating a deep beam, as the distance is about 70 ft., we divided it into three conduits, thus reducing the length and height of the span. Those three conduits were built of different sizes and at different grades. First, we wanted to concentrate all the dry-weather flow into one drain, so that it would be kept clean and washed out. That was one of the troubles with the Falls. It had a broad bed with jagged bottom and sides, and by building three conduits and putting the dry-weather flow into one conduit, we keep the conduit cleared of deposits.

You will see, in going through the tunnel, when you come out into the bellmouth, how we have arranged the three conduits so as to throw the water coming from the dam into the smaller or eastern tube. As the east tube becomes insufficient to take care of the flow, the water goes into the next tube, and when that is too small it goes into the third tube, somewhat on the order of the siphon, except that these conduits are side by side, and the siphon is above and below.

The conduits and tunnel are designed to take care of 15 000 cu. ft. per sec., which is quite a large quantity of water.

The point where we will start on our inspection tour is only about a five-minute walk from here, and we thought, as it would be near lunch time, that it would be appropriate to serve a lunch in the tunnel, which is perfectly dry and just as comfortable as this room. Anybody who has rheumatism need not fear going down, as it is in nice shape. We will take our lunch, come out at the lower end of the tun-

Address by Mr. Hendrick (continued).

nel, walk over the viaduct and over the enclosed Falls to the Pumping Station where cars will meet us and take us to the Back River Disposal Plant. I do not think it will take very long. The idea is to assemble at the main entrance of the Belvedere as near twelve o'clock as possible, and walk a couple of blocks to the entrance of the tunnel. It is desirable to have tickets, which are on the desk. We have limited the lunch invitation entirely to the engineers, because we felt that we could not accommodate the public if we attempted to do so. We hope very much you will be with us.

THE PRESIDENT.—It is not to be understood that the ladies of the Convention are not expected on the trip through the sewers?

MR. HENDRICK.—No; we would be very glad to have them.

THE PRESIDENT.—We would be very glad to have the ladies of the party go on the trip through the sewers. The next speaker is Mr. E. B. Whitman, the Secretary of the Water Board.

Address by E. B. Whitman.

E. B. WHITMAN, M. AM. SOC. C. E.—Mr. President, Ladies and Gentlemen, and Fellow-Members of the American Society: For about 10 years the cry of "water famine"—"Be careful of the use of your water"—has been ringing through the City of Baltimore every summer. My predecessor in office, Alfred M. Quick, M. Am. Soc. C. E., recognized the fact that we needed a greater water supply, and he made the first studies of the question of securing an additional supply for Baltimore.

In addition to the fact that we needed more water, we have also been called by one of the newspaper scribes in the city "the typhoid capital of the United States"—a rather unenviable distinction—but we have relinquished this questionable honor during the past 2 years through the use of calcium hypochlorite, which we have dosed into the water in as large quantities as 50 lb. per 1 000 000 gal.

When I was out in Cleveland this spring they were using 10 lb. per 1 000 000 gal., and the citizens there were forming anti-chlorine leagues and writing letters to the newspapers protesting against its use. When I told those in charge of Cleveland's water department that we were using 50 lb. in Baltimore, without any serious protest, they were very much astonished; but that 50 lb. has cut our typhoid just about in half.

I do not intend to go into a description of our new impounding reservoir and our filtration plant, other than a very brief one, but I hope to have the pleasure of presenting a description of the new work to the Society in the form of a paper.

This afternoon we will go first to Lake Clifton. In order to connect the filtration plant with the existing mains it is necessary to build a new pressure tunnel. There was an old tunnel, 12 ft. in diameter, which carried the water by gravity, but, with the installation of the filtration plant, the source of supply will be 50 ft. higher than the present one, and will put that tunnel in some places under a pressure

of 35 lb. Therefore, it was a question of either lining the old tunnel in some way, or building an entirely new one. What we finally decided to do was to build a reinforced concrete tunnel, made up in sections, inside the old tunnel.

Now, it is necessary to supply the city with water through the old tunnel at the same time that we are building the new concrete pressure tunnel inside of it; that is, we have Lake Clifton at the lower end of the tunnel which holds about 25 000 000 gal. of water, and will supply the city for about 3 days. We fill that lake, then drain the tunnel, and work in it from 42 to 70 hours. Then work is stopped until the lake is again filled. The reinforced concrete pipe is made up in sections which are jointed in the tunnel.

Now, it would seem rather a risky matter to make a reinforced concrete tunnel in new ground where the back-fill would probably cause settlement and open the joints; but we calculated that, in this old tunnel we would secure a solid foundation, and could make the joints without any difficulty. I saw lengths of 7-ft. pipe made at Ampere, N. J., and tested up to 50 lb. pressure, and I saw some 4-ft. pipes tested up to 95 lb. pressure, without any leakage at the joints.

At Lake Clifton we will see these pipes, many of which are on the ground. The plant for making them is one of the most interesting I have ever seen. The contractors have certainly gone at their work in a most systematic manner.

After that we will go to Lake Montebello, where the filtration plant is located, and those who want to take the trip over the plant can walk and see the various features of the construction work; and the ladies, who are specially invited on this trip because of the natural beauty of the scenery *en route,* if they do not wish to take this walk, can stay in the machines and we will meet them at the far end of the work.

The route of the trip will start at our wash-water dams. In disposing of the wash-water from the filtration plant, we have constructed earth dams with the excess excavation, and we expect to hold the wash-water back of those two dams for several days, until it has settled and is comparatively clear and comparatively pure. If it is not pure we will put in a small separate filtration plant there and filter the wash-water, or pump it, after settling, back into the coagulating basins and let it again pass through the filters. The filtration plant will have a daily capacity of 128 000 000 gal.

The water will be taken from the old Loch Raven tunnel, through a shaft, and will be raised by centrifugal pumps into the filtration plant, having a lift of about 20 ft. The head-house is well under way, and is designed to apply either lime and iron or alum in solution

Address by Mr. Whitman (continued).

to the water. Provision is also made for applying a solution of calcium hypochlorite from the head-house.

Two reservoirs under the filters are very nearly completed, and the filter boxes are being poured. Four or five of them are completed. They are the usual 4 000 000-gal. filter units which are common in the larger types of mechanical filter plants.

After leaving Lake Montebello and the filtration plant we will get into the machines and go to Loch Raven, a distance of about 10 or 12 miles, passing through some of the most beautiful country in the eastern part of the United States. On reaching Loch Raven we will inspect a 10-ft. pressure tunnel, made of steel, surrounded with concrete, and lined with mortar.

This lining is a little different from the mortar lining of the Catskill Aqueduct, in that it is reinforced and is placed with a cement gun. The work was exceedingly satisfactory, except in the invert, where we had considerable trouble from the rebound of the gun; that is, the sand and stone from the gun dropped on the invert, and was covered over, so that the lining was not solid on the bottom of the tunnel.

We have gone over and tapped every square foot of the invert with a hammer, and could tell from the hollow sound where the rebound is caught, and the contractor has found it necessary to dig out those spots and replace the mortar where the rebound had been caught under the lining.

The new dam at Loch Raven is completed, with the exception of closing the relief opening through which the water passes. The dam is built in the old Loch Raven and was coffer-dam work throughout. Relief openings were left in the first half of the dam, and then the second half was completed while the stream flow passed through those relief openings.

We cannot close these openings until we can get three or four pieces of property which will be overflowed by the reservoir. The dam has not been built to the height to which it was proposed to raise it, and which was recommended by the consulting engineers, Messrs. Stearns and Freeman, largely because we did not have enough money to build both the high dam and the filtration plant, and also on account of certain legal complications in regard to the purchase of property.

This dam has been built, however, in such a way that it can be increased in height. The joining of the new work to the old will be accomplished by means of large plum stones which are left in the finished work; and, if we think it necessary, we will drill into the old dam and put in steel rods at intervals across the dam.

On the lawn of the gate-keeper's house at the dam, we will serve light refreshments to the ladies and gentlemen who go with us, and,

after leaving there, we will pass up the valley of the Gunpowder River to the Dulaney Valley Pike.

In connection with the construction of the dam, it was necessary to build two new bridges, 600 and 1 000 ft. long, respectively. We will pass under the 600-ft. bridge. It is of rather novel construction, in that the falsework for the two 300-ft. spans is a suspension bridge falsework. There are twelve 1¼-in. cables on which are built two catenary trusses, and the bridge has been built on this suspended falsework, and is now practically completed.

The upper bridge can be seen up the valley, but we will not attempt to go there.

On our way home we will come back through Towson and Charles Avenue passing through Guilford, one of the most beautiful suburban developments, not only in this country, but in the world. We hope to have the pleasure of entertaining as many of you as have not decided to go on the other three trips.

THE PRESIDENT.—I am quite sure that I voice the sentiments of all the members present in expressing thanks to the gentlemen who have addressed us to-day, and also in expressing the hope that they will all prepare papers, and present them to the Society, descriptive of the work which they have told us about to-day in brief. The problems are those in which many of us are deeply interested, and Baltimore is not altogether alone in its condition of crooked streets, undeveloped water supply, and uncompleted sewerage.

Before we adjourn I would like to state that the ball and reception which have been tendered to us to-night will be on the part of the Engineers' Club of Baltimore, an organization now composed of 279 members, and only nine years old. I think that shows remarkable progress.

There being nothing further before this meeting, I now declare it adjourned. Meeting Adjourned.

FORTY-SIXTH ANNUAL CONVENTION

EXCURSIONS AND ENTERTAINMENTS

The arrangements were in the hands of the following Committees:

Committee of Arrangements of the Board of Direction

JAMES H. EDWARDS, *Chairman;*
GEORGE W. FULLER, CHAS. WARREN HUNT.

Local Committee

FRANCIS LEE STUART, *Chairman;*

MENDES COHEN,	W. ANDERSON POLK,
F. H. HAMBLETON,	LAYTON F. SMITH,
W. W. CROSBY,	H. A. WARREN,
J. E. GREINER,	E. B. WHITMAN.

Informal Reception

Monday, June 1st, 1914.—8.30 P. M.—An informal reception, which was attended by a large number of members and guests, was held at the Belvedere Hotel, and dancing continued until a late hour.

Golf Tournament and Tea

Tuesday, June 2d.—12.00 Noon.—About thirty members of the Society took part in a Golf Tournament, 18-hole medal play, at the Baltimore Country Club. About 200 members and guests spent the afternoon at the Club grounds, and tea was served from 4.00 to 7.00 P. M.

Excursion to Annapolis

Wednesday, June 3d.—The day was devoted to an Excursion by Steamer to Annapolis, the start being made at 10 A. M., and the party returning to Baltimore at 9.15 P. M. By invitation of the Secretary of the Navy, the party, immediately after landing, went to the Auditorium of the Naval Academy where an address of welcome was delivered by Ralph Whitman, Assoc. M. Am. Soc. C. E., on behalf of the Superintendent of the Academy, after which several hours were spent in inspecting the buildings and grounds and in viewing seamanship drills by the cadets. Some of the members also visited the Maryland State House and points of historical interest in Annapolis. One of the numerous interesting features of the day was the Dress Parade of the cadets at 6.00 P. M.

Luncheon and supper were served on the boat, and there was music and dancing.

Engineering Inspection Tours

Thursday, June 4th.—Afternoon.—In order that each member might inspect the kind of engineering work in which he was particu-

larly interested, four Excursions were arranged, to cover the important classes of work under construction by the City Departments of Baltimore. As noted elsewhere, these works had been described at the meeting held on Thursday morning. The four trips were as follows:

Water Supply.—Under the guidance of E. B. Whitman, M. Am. Soc. C. E., Consulting Engineer to the Water Board, a party of about 200 visited the extensive works furnishing the water supply to the City, including the new filtration plant and low-level pumping station at Clifton Park and Montebello Park, reinforced concrete pressure conduits, 9 and 10 ft. in diameter, and the new dam at Loch Raven, where refreshments were served. This automobile trip covered a large area and gave an excellent opportunity to view, not only the city, but also the beautiful country surrounding it.

Sewerage System.—About 100 members and guests accepted the invitation of Calvin W. Hendrick, M. Am. Soc. C. E., Chief Engineer, Baltimore Sewerage Commission, to a dinner in the 29-ft. diversion drainage tunnel under Guilford Avenue, said to be the largest drainage tunnel in the world. After dinner the party proceeded through the Falls Viaduct and the covered portion of Jones Falls to the Sewage Pumping Station. After inspecting the station a trip was made to the Sewage Disposal Plant at Back River where an opportunity was given to view the operation of the plant, which is now nearing completion.

Harbor.—O. F. Lackey, M. Am. Soc. C. E., Harbor Engineer of Baltimore, was in charge of a party of more than 100 which inspected the harbor works, on the Steamer *F. C. Latrobe.* Several hours were spent in viewing the City Docks and Piers and other interesting engineering features of the harbor. Luncheon was served on the steamer, and there was music and dancing.

City Planning and Paving.—Through the courtesy of R. Keith Compton, M. Am. Soc. C. E., Chief Engineer of the Paving Commission, and other city officials, about 75 members and guests took an automobile ride through a large part of the City and the Park System, including the noted Druid Hill Park. An opportunity was afforded to inspect the many forms of pavement laid in the streets and parks, and to study the effects of traffic. Those taking this trip obtained a comprehensive idea of the city and the plans being consummated for opening new streets in the surburbs. Luncheon was served at the hotel in Druid Hill Park at which an interesting description of the Park System was given by George W. Williams, President of the Park Board.

Reception

Thursday, June 4th.—In the evening a reception was given by the Engineers' Club of Baltimore to the members of the Society and accompanying ladies at the Belvedere Hotel. The President of the

Engineers' Club, J. H. Milburn, and Hunter McDonald, President, Am. Soc. C. E., received. A large number attended, and dancing continued until 3.00 A. M.

Excursion to Sparrows Point and Fort Howard

Friday, June 5th.—At noon a party of more than 400 started on the Steamer *F. C. Latrobe* for Sparrows Point, where, at the invitation of F. W. Wood, President, The Maryland Steel Co., a most interesting visit was made to the ore docks, power-house, furnaces, and rolling-mills of that company. After spending more than an hour in this inspection, the trip was continued to Fort Howard, where, through the courtesy of Gen. E. M. Weaver, Chief of Ordnance, U. S. A., an opportunity was given to see the modern coast-defense guns at that fort. A demonstration was given of the methods of loading and sighting the guns. The visitors remained at the fort until about 5.30 P. M., when some returned to Baltimore by trolley and others by boat. Luncheon and supper was served on the steamer, and there was music and dancing.

Smoker

Friday, June 5th.—In the evening, an informal farewell Smoker at the Belvedere Hotel, to which the ladies were invited, was largely attended. A musical entertainment was followed by dancing.

Attendance

The following 346 members were in attendance. There were also present 372 ladies and others of the families of members.

Aiken, W. A....Philadelphia, Pa.
Alvord, J. W.....Chicago, Ill.
Andrews, Horace...Albany, N. Y.
Armstrong, J. W..Baltimore, Md.

Babcock, W. S....New York City
Baird, H. C.....New York City
Beach, L. H.....Baltimore, Md.
Bean, G. L.....Philadelphia, Pa.
Beardsley, J. W.,
Guayama, Porto Rico
Beatty, P. A.....Baltimore, Md.
Bebb, E. C....Washington, D. C.
Begg, R. B. H....Blacksburg, Va.
Behrman, I. E....Baltimore, Md.
Belcher, W. E..Bloomfield, N. J.
Belknap, F. W....New York City
Bensel, J. A.....Albany, N. Y.
Bernstein, Lester..Baltimore, Md.
Berry, J. B.....Chicago, Ill.
Binford, C. M.....Riley, W. Va.
Bixby, W. H..Washington, D. C.
Blanchard, A. H..New York City
Boardman, C. S....Buffalo, N. Y.
Bolton, C. M..Charlottesville, Va.
Brendlinger, P. F.,
Philadelphia, Pa.
Brown, W. N..Washington, D. C.
Brunner, John.....Chicago, Ill.
Brush, W. W.....New York City
Bryan, C. W.....New York City
Bryson, Andrew..New Castle, Del.
Buel, A. W.....New York City
Burwell, R. L.....Baltimore, Md.
Bush, E. W.....Lynn, Conn.
Bush, H. D.....Baltimore, Md.
Bush, Lincoln....New York City
Busse, F. A.....Louisville, Ky.

Carle, N. A.....Newark, N. J.
Carlson, C. A..Washington, D. C.
Carr, D. O.....Toledo, Ohio
Cary, R. L.....Baltimore, Md.
Cattell, W. A..San Francisco, Cal.
Chadbourn, W. H.,
Wilmington, N. C.
Chamberlaine, R. L. Baltimore, Md.
Cheney, H. N.....Boston, Mass.
Childs, O. W.....St. Louis, Mo.
Churchill, C. S.....Roanoke, Va.
Cilley, Morgan.Washington, D. C.
Clarke, G. C.....New York City
Class, C. F.....Lancaster, Pa.
Coe, C. S.....Marathon, Fla.
Cohen, Mendes....Baltimore, Md.
Cole, E. L.....Baltimore, Md.
Cole, H. O.....Baltimore, Md.
Coleman, J. F..New Orleans, La.
Compton, R. K...Baltimore, Md.
Conard, W. R..Burlington, N. J.
Connell, W. H..Philadelphia, Pa.
Connor, E. H..Leavenworth, Kans.
Connor, W. D..Washington, D. C.
Cook, J. H.....Paterson, N. J.
Cooksey, R. M....Baltimore, Md.
Cooper, D. R....New York City
Covert, C. C.....Albany, N. Y.
Craig, J. W.....Baltimore, Md.
Crockard, F. H. Birmingham, Ala.
Crooks, C. H.....New York City
Crosby, W. W....Baltimore, Md.
Cummings, E. D..Baltimore, Md.
Cummings, R. A..Pittsburgh, Pa.
Curtis, J. E...Washington, D. C.

Darrow, F. T....Lincoln, Nebr.
Davis, C. E.....Philadelphia, Pa.
Davis, R. P..Morgantown, W. Va.
de la Barre, William,
Minneapolis, Minn.
Dennis, W. F..Washington, D. C.
Deyo, S. L. F....New York City
Dibert, H. McM.....Troy, N. Y.
Dorsey, Leander..Baltimore, Md.
Dorsey, W. H.....Baltimore, Md.
Douglas, E. M..Washington, D. C.
Doying, W. A. E.,
Washington, D. C.
Doyle, J. S.....Baltimore, Md.
Duffee, L. W.....Mobile, Ala.
Dyer, A. J.....Nashville, Tenn.

Earle, Thomas.....Steelton, Pa.
Edwards, J. H.....Passaic, N. J.
Edwards, W. R.Washington, D. C.
Elliott, C. G..Washington, D. C.
Emanuel, M. C....St. Louis, Mo.
Endicott, M. T.Washington, D. C.

Felton, H. C.....Camden, N. J.
Fendall, B. T.....Baltimore, Md.
Ferguson, L. R..Philadelphia, Pa.
Fisher, E. A.....Rochester, N. Y.
Flick, J. K.....Baltimore, Md.
Focht, Louis.....Trenton, N. J.
Foss, F. E.....New York City
Foster, C. M.....Chicago, Ill.
Fox, Henry.....Baltimore, Md.
Fox, J. A.....Memphis, Tenn.
Frazier, Harry....Richmond, Va.
French, O. B..Washington, D. C.
Freyhold, Felix.Washington, D. C.
Fuller, G. W.....New York City
Furber, W. C...Philadelphia, Pa.

Gadd, R. F.....Hartford, Conn.
Gailor, C. F.....Baltimore, Md.
Gerry, M. H., Jr..Helena, Mont.
Giles, A. L.....Glenside, Pa.
Gilman, Charles..Plainfield, N. J.
Goldmark, Henry,
Culebra, Canal Zone, Panama
Greiner, J. E.....Baltimore, Md.
Griffith, J. H.....Pittsburgh, Pa.
Grunsky, C. E.San Francisco, Cal.

Hackney, J. W.Atlantic City, N. J.
Hains, P. C...Washington, D. C.
Hall, H. R.....Baltimore, Md.
Hall, W. M..Parkersburg, W. Va.

Hammond, J. F.,
Richmond Hill, N. Y.
Harley, A. F...Jacksonville, Fla.
Harlow, J. H....Darlington, Md.
Harper, I. O.....Baltimore, Md.
Harrington, F. F....Norfolk, Va.
Harris, G. B....Philadelphia, Pa.
Harrison, B. P....Baltimore, Md.
Harrison, E. P. H.,
Martinsburg, W. Va.
Harrison, W. B.Washington, D. C.
Hartman, A. H...Baltimore, Md.
Haskell, E. E.....Ithaca, N. Y.
Haskins, W. J....New York City
Hastings, E. M....Richmond, Va.
Haswell, J. R.....Easton, Md.
Hauck, William..New York City
Haydock, Charles.Philadelphia, Pa.
Heiges, T. T.....York, Pa.
Hendrick, C. W...Baltimore, Md.
Henny, D. C.....Portland, Ore.
Hering, Rudolph..New York City
Hess, E. W.....Clearfield, Pa.
Hoag, S. W., Jr..New York City
Hodgdon, F. W....Boston, Mass.
Hodge, H. W.....New York City
Hood, J. M., Jr...Baltimore, Md.
Hovey, O. E.....New York City
Hubbell, G. S..Wilmington, N. C.
Hughes, Norman..Jackson, N. C.
Humphrey, R. L..Philadelphia, Pa.
Hunt, C. B...Washington, D. C.
Hunt, Chas. Warren,
New York City
Hurlbut, H. B..Washington, D. C.

Jacoby, H. S.....Ithaca, N. Y.
Janney, W. D....Baltimore, Md.
Jarrett, E. S.....New York City
Johnson, A. L....Buffalo, N. Y.
Johnson, J. M.....Louisville, Ky.
Jones, G. R.....Lawrence, Kans.

Khuen, Richard..Pittsburgh, Pa.
Kienle, J. A.....New York City
King, P. S.....Wilmington, Del.
Knapp, L. H.....Buffalo, N. Y.
Knowles, Morris..Pittsburgh, Pa.

Lackey, O. F.....Baltimore, Md.
Lane, H. A.....Baltimore, Md.
Lang, P. G., Jr..Baltimore, Md.
Larsson, C. G. E..New York City
Lathrop, J. C.....Baltimore, Md.
Lawrence, E. C....Baltimore, Md.
Lee, W. B.....New York City
Leighton, M. O.Washington, D. C.
Leonard, H. R..Philadelphia, Pa.
Lepper, F. W..Washington, D. C.
Lesley, R. W...Philadelphia, Pa.
Letson, T. H.....New York City
Lewis, E. W...New Haven, Conn.
Lindenthal, Gustav.New York City
Long, M. A.....Baltimore, Md.
Loweth, C. F.....Chicago, Ill.
Lum, D. W....Washington, D. C.

Machen, H. B....New York City
Mackall, J. N.....Baltimore, Md.
Macy, E. C.....Boston, Mass.
McComb, D. E..Washington, D. C.
McCormack, E. W.,
Washington, D. C.
McDonald, Hunter,
Nashville, Tenn.
McKinney, F. W..Baltimore, Md.
McLain, L. R..St. Augustine, Fla.
McLure, N. R....Phœnixville, Pa.
McNaugher, D. W..Pittsburgh, Pa.
McRae, H. C.....Baltimore, Md.
Main, C. T.....Boston, Mass.
Maitland, G. F..Cheyenne, Wyo.
Marani, V. G....Cleveland, Ohio
Marshall, T. W.Washington, D. C.
Mehren, E. J.....New York City
Meriwether, Coleman,
New York City
Merriman, Mansfield,
New York City

Merriman, R. M., San Juan, Porto Rico
Merriman, Thaddeus, New York City
Miller, H. A.....Boston, Mass.
Modjeski, Ralph...Portland, Ore.
Mogensen, O. E..New York City
Molitor, Frederic..New York City
Montfort, Richard.Louisville, Ky.
Moore, C. H.....New York City
Moritz, E. A..Washington, D. C.
Morse, H. S....Cincinnati, Ohio
Morse, R. B.....Baltimore, Md.
Moser, Charles....Palo Alto, Cal.
Mott, W. E.....Pittsburgh, Pa.
Murray, J. F....Philadelphia, Pa.

Newcomb, W. T.....Easton, Pa.
Newell, F. H..Washington, D. C.
Nichols, W. S..Philadelphia, Pa.
Noland, C. P., Jr..Baltimore, Md.
Northrop, A. A....Keokuk, Iowa

Ockerson, J. A....St. Louis, Mo.
Ogden, H. N.....Ithaca, N. Y.
Ostrander, J. E...Amherst, Mass.

Pagon, W. W., South Norwalk, Conn.
Paine, H. A....Wilmington, Del.
Peabody, W. W. White Plains, N.Y.
Pegram, G. H....New York City
Pence, W. D.....Chicago, Ill.
Perkins, W. W. C., Niagara Falls, N. Y.
Pitts, T. D.....Baltimore, Md.
Polk, W. A.....Baltimore, Md.
Poole, C. A.....Rochester, N. Y.
Porter, H. T.....Greenville, Pa.
Powell, T. J...Washington, D. C.
Pratt, M. D.....Baltimore, Md.
Proctor, R. F....Baltimore, Md.

Quick, A. M.....Baltimore, Md.
Quimby, H. H..Philadelphia, Pa.

Ralston, J. C....Spokane, Wash.
Randell, R. R..Washington, D. C.
Reed, P. L....Washington, D. C.
Reeves, W. F....New York City
Regester, H. S., Jr..Baltimore, Md.
Reichmann, A. F....Chicago, Ill.
Reid, C. L....Fredericksburg, Va.
Reimann, R.....Baltimore, Md.
Reppert, C. M....Pittsburgh, Pa.
Requardt, G. J....Baltimore, Md.
Rhea, Frank...Washington, D. C.
Richardson, J. W..Baltimore, Md.
Ridgway, Robert..New York City
Rights, L. D.....New York City
Roberts, S. S.....Chicago, Ill.
Rose, R. V..Niagara Falls, N. Y.
Rosenthal, Albert..Baltimore, Md.

Saunders, G. C....Baltimore, Md.
Saville, Charles..New York City
Schall, F. E..South Bethelehem Pa.
Schneider, C. C..Philadelphia, Pa.
Scott, C. B.....Richmond, Va.
Seaman, H. B....New York City
Shaner, H. L....Lynchburg, Va.
Shaw, G. H....Washington, D. C.
Shema, Joseph....Pittsburgh, Pa.
Shirley, H. G.....Towson, Md.
Shoemaker, L. H..Pittsburgh, Pa.
Shuman, L. D..Philadelphia, Pa.
Sickman, A. F....Holyoke, Mass.
Silliman, Charles, Washington, D. C.
Simpson, G. H.....Bellevue, Pa.
Sinclair, L. H..Washington, D. C.
Skinner, J. F....Rochester, N. Y.
Smith, A. C., Jr..Baltimore, Md.
Smith, H. S....Wilkes-Barre, Pa.
Smith, J. W.....New York City
Smith, L. F.....Baltimore, Md.
Smith, Oberlin..Bridgeton, N. J.
Souder, Harrison..Cornwall, Pa.
Spear, W. E.....New York City
Spencer, Herbert..New York City
Sprague, N. S....Pittsburgh, Pa.

Sprol, S. J.....Baltimore, Md.
Staniford, C. W...New York City
Stearns, E. B.....New York City
Stearns, R. H.....Boston, Mass.
Stephens, G. W., Jr. Baltimore, Md.
Stern, E. W.....New York City
Strickler, G. B..Fredericksburg, Va.
Strouse, W. F....Baltimore, Md.
Stuart, A. A.....Brooklyn, N. Y.
Stuart, F. L.....Baltimore, Md.
Stuart, J. T....Philadelphia, Pa.
Sudler, Emory....Baltimore, Md.
Sutton, Frank..Washington, D. C.
Swain, G. F.....Boston, Mass.

Talbot, A. N.....Urbana, Ill.
Talcott, H. R....Baltimore, Md.
Taylor, A. J....Wilmington, Del.
Taylor, T. U.....Austin, Tex.
Teal, J. E.....Baltimore, Md.
Temple, E. B...Philadelphia, Pa.
Thacher, Edwin..New York City
Thompson, A. W..Baltimore, Md.
Thompson, R. A.,
San Francisco, Cal.
Thompson, S. E.,
Newton Highlands, Mass.
Thomson, T. K..New York City
Tidd, A. W..White Plains, N. Y.
Tilden, C. J.....Baltimore, Md.
Townsend, C. McD..St. Louis, Mo.
Trautwine, J. C., Jr.,
Philadelphia, Pa.
Triest, W. G.....New York City
Tuska, G. R.....New York City
Tuttle, A. S.....New York City

Upson, M. M.....New York City

Vail, J. J.....Rahway, N. J.
Van Cleve, A. H..New York City
Vandevanter, C. O..Baltimore, Md.
Vandevanter, Elliott,
Baltimore, Md.
Van Horne, J. G..New York City
Van Suetendael, A. O.,
Albany, N. Y.
Verveer, E. L....New York City
von Schon, H. A. E. C.,
Detroit, Mich.
Voorhees, Paul...Harrisburg, Pa.
Vredenburgh, Watson, Jr.,
New York City

Wadsworth, J. E..New York City
Wagner, S. T...Philadelphia, Pa.
Warren, H. A....Baltimore, Md.
Watson, W. J....Cleveland, Ohio
Weakland, F. L..Meyersdale, Pa.
Weller, F. R...Washington, D. C.
Wendt, E. F...Washington, D. C.
Wentworth, C. C....Roanoke, Va.
Wernecke, Chauncy..Seattle, Wash.
Whitman, E. B...Baltimore, Md.
Whitman, Ralph..Annapolis, Md.
Wickes, J. L.....Baltimore, Md.
Wigley, C. G.....Trenton, N. J.
Wiley, W. H.....New York City
Williams, H. R...Baltimore, Md.
Williar, H. D., Jr..Baltimore, Md.
Willoughby, J. E.,
Wilmington, N. C.
Wilson, H. M....Pittsburgh, Pa.
Winsor, F. E..White Plains, N. Y.
Woermann, J. W..St. Louis, Mo.
Wolfe, F. C.....Baltimore, Md.
Wölfel, P. L.....Pittsburgh, Pa.
Wood, G. P.....Peekskill, N. Y.
Wood, W. B....Wilmington, Del.
Worcester, J. R....Boston, Mass.
Worley, J. S....Kansas City, Mo.
Wrenn, J. F.....Norfolk, Va.

Yappen, Adolph.....Chicago, Ill.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

September 2d, 1914.—8.30 P. M.—A regular business meeting will be held, and two papers will be presented for discussion, as follows: "Some Principles Relating to the Administration of Streams", by Clarence T. Johnston, Assoc. M. Am. Soc. C. E.; and "The Construction of the Klondike Pipe Line", by W. W. Edwards, Assoc. M. Am. Soc. C. E.

These papers were printed in *Proceedings* for May, 1914.

September 16th, 1914.—8.30 P. M.—At this meeting two papers will be presented for discussion, as follows: "The Constant-Angle Arch Dam", by Lars R. Jorgensen, Assoc. M. Am. Soc. C. E.; and "Subaqueous Highway Tunnels", by George Duncan Snyder, M. Am. Soc. C. E.

These papers were printed in *Proceedings* for May, 1914.

October 7th, 1914.—8.30 P. M.—This will be a regular business meeting. Two papers will be presented for discussion as follows: "External Corrosion of Cast-Iron Pipe", by Marshall R. Pugh, M. Am. Soc. C. E.; and "A Method of Determining Storm-Water Run-Off", by Charles B. Buerger, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

October 21st, 1914.—8.30 P. M.—At this meeting two papers will be presented for discussion, as follows: "The Design and Construction of Four Reinforced Concrete Viaducts at Fort Worth, Texas", by S. W. Bowen, M. Am. Soc. C. E.; and "The Clarification of Sewage by Fine Screens", by Kenneth Allen, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

THE USE OF THIN PAPER FOR PUBLICATIONS

Under date of April 18th, 1914, there was mailed to the membership of the Society, by order of the Board of Direction, a circular with a return form in order to enable the membership to state their preference as to the use of thin paper in the publications of the Society.

The replies which have come in between April 21st and July 6th have been tabulated, with the following result:

3 317 replies have been received.

2 889 of these are in favor of the thin paper both for *Proceedings* and *Transactions*, and 98 are opposed.

64 are in favor of the thin paper for *Proceedings* and against its use for *Transactions*.

245 are against the use of thin paper in *Proceedings* and in favor of its use in *Transactions.*

11 vote "yes" for the use of thin paper in *Proceedings* and vote a blank as to its use in *Transactions.*

10 vote blank on the use of thin paper in *Proceedings* and vote "yes" for its use in *Transactions.*

Summing this up, and excluding the blanks, it appears that 2 964 out of the total vote of 3 317 (or about 90%) are in favor of the use of thin paper in the monthly *Proceedings,* and that 3 144 out of a total of 3 316 (or about 95%) are in favor of the use of thin paper in the *Transactions.*

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work the Appendices* to the Annual Reports of the Board of Direction for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings.*

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

* *Proceedings*, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings,* and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions.*

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings.*

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meeting)

April 17th, 1914.—The meeting was called to order; President Snyder in the chair; W. A. Cattell, M. Am. Soc. C. E., acting as Secretary; and present, also, 64 members and guests.

The following visiting members of the Society were guests of the Association for the evening: Messrs. George G. Anderson, Allen Hazen, Leonard Metcalf, and William Mulholland. J. J. C. Bradfield, Chief Engineer, Metropolitan Railway Construction, Public Works Department, Sydney, New South Wales, was also a guest. Each of these gentlemen addressed the meeting briefly.

A paper entitled "A Brief Review of the Petroleum Industry of California", by J. H. G. Wolf, M. Am. Soc. C. E., was presented by the author, and the subject was discussed by Messrs. Moran, Hohl, and others, after which, through the courtesy of Messrs. F. B. Hen-

derson and Bell, of the Associated Oil Company, a series of moving pictures illustrating portions of the oil fields were shown.

Adjourned.

May 25th, 1914.—An informal reception and luncheon, at which 62 members and guests were present, was tendered William Cushing Edes, M. Am. Soc. C. E., at the Palace Hotel, by the members of the Association, in honor of his appointment as Chairman of the Alaskan Railway Commission.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Roger W. Toll, Assoc. M. Am. Soc. C. E., 700 Tramway Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 P. M., at the Colorado Electric Club.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meetings)

May 16th, 1914.—At the invitation of the University of Colorado, the regular meeting was held at Boulder, Colo. In the afternoon, the members and their guests attended a track meet as guests of the University and afterward went to the Testing Laboratory to witness a test of one of the reinforced concrete cantilever beams made in connection with the Colfax Larimer Viaduct. In the evening there was an informal dinner at the Boulderado Hotel.

The meeting was called to order; President Ridgway in the chair; Roger W. Toll, Secretary; and present, also, 25 members and guests.

Messrs. M. S. Ketchum, George G. Anderson, H. W. Cowan, H. S. Crocker, and A. L. Fellows were appointed a Nominating Committee, by the President, with Mr. Ketchum as Chairman.

A paper by H. S. Crocker, M. Am. Soc. C. E., on "The Design and Construction of the Fourth South Street Viaduct, in Salt Lake City, Utah", was read by I. O. Thorley, Assoc. M. Am. Soc. C. E., and the subject was discussed by Messrs. J. R. Scott, C. L. Eckel, W. R. Weber, and others.

A vote of thanks was tendered Dean Ketchum and the University of Colorado for the courtesies extended by them and also to those who took part in the meeting.

Adjourned.

June 13th, 1914.—The Sixth Annual Meeting was called to order; President Ridgway in the chair; Roger W. Toll, Secretary; and present, also, 13 members and guests.

The minutes of the meeting of May 16th, 1914, were read and approved.

The Report of the Nominating Committee was read and adopted.

Messrs. C. S. Lambie and L. E. Bishop were appointed Tellers to canvass the ballots for Officers for the ensuing year.

The President presented his Annual Address, and the Report of the Secretary-Treasurer for the fiscal year ending June 13th, 1914, was read and adopted.

On motion by the Treasurer, duly seconded, Messrs. H. H. Logan and L. R. Hinman were appointed a Committee to audit the books of the Association for the preceding year.

A paper by Mr. Henry Read, President of the Denver Art Commission, entitled "Art in the Training of an Engineer", was presented by the author. The subject was discussed generally by those present, and a vote of thanks was tendered Mr. Read for his interesting paper.

The Report of the Tellers appointed to canvass the ballots for Officers was presented.

The President declared the election of the following officers:

President, E. F. VINCENT, M. AM. SOC. C. E.,
Vice-President, J. Y. JEWETT, ASSOC. M. AM. SOC. C. E.
Secretary-Treasurer, ROGER W. TOLL, ASSOC. M. AM. SOC. C. E.

Adjourned.

Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club.

At the meeting of the Association on December 29th, 1913, the new Chairman, John Ruddle, M. Am. Soc. C. E., was installed, and Messrs. Park A. Dallis and G. R. Solomon were appointed members of the Executive Committee. T. P. Branch, Assoc. M. Am. Soc. C. E., was elected Secretary.

Louisiana Association

The Louisiana Association of Members of the American Society of Civil Engineers, has been organized with the following officers: Frank M. Kerr, President; J. F. Coleman and W. B. Gregory, Vice-Presidents; A. M. N. Blamphin, Treasurer; and L. C. Datz, Secretary.

Philadelphia Association

On December 22d, 1913, the Philadelphia Association of Members of the American Society of Civil Engineers was organized with the following officers: George S. Webster, President; Richard L. Humphrey and F. Herbert Snow, Vice-Presidents; John Sterling Deans, J. W. Ledoux, Edgar Marburg, and H. S. Smith, Directors; S. M. Swaab, Treasurer; and W. L. Stevenson, Secretary. The meetings of the Association will be held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

Portland, Ore., Association

On June 18th, 1913, the Portland, Ore., Association of Members of the American Society of Civil Engineers was organized with the following officers: E. G. Hopson, President; W. S. Turner, First Vice-

President; D. D. Clarke, Second Vice-President; G. B. Hegardt, Treasurer; and Charles J. McGonigle, Secretary.

(Abstract of Minutes of Meeting)

June 5th, 1914.—The meeting was called to order at the Commercial Club; President E. G. Hopson in the chair; Charles J. McGonigle, Secretary.

The minutes of the preceding meeting were read and approved.

Communications to Hunter McDonald, President, Am. Soc. C. E., and from the Secretary of the American Society of Civil Engineers, the Oregon Society of Engineers and the Colorado Association of Members of the American Society of Civil Engineers, were read and ordered filed.

On vote of the Meeting it was decided to reduce the size of the pamphlet containing the By-Laws and List of Members of the Association to fit an ordinary envelope, and the purchase of the same was referred to the Secretary with power to act.

A letter to President Hopson announcing his appointment as a member of the Society's Committee on the Award of Prizes was read.

On motion by John T. Whistler, M. Am. Soc. C. E., it was decided that meetings of the Association be abandoned until October, a trip either to the River Mill Development, Celilo Falls Government Work, or to the Government work at the North Jetty being suggested instead.

A paper by Mr. Frederick W. Mulkey, Chairman of the Commission of Public Docks, entitled "Portland Harbor and Docks", was presented by the author, and the subject was generally discussed by those present. A vote of thanks was tendered Mr. Mulkey for his paper.

Adjourned.

Seattle Association

At the Annual Meeting of the Association, held on January 26th, 1914, the following officers were elected for the ensuing year: Ernest B. Hussey, President; A. H. Fuller, Vice-President; and Carl H. Reeves, Secretary-Treasurer.

Southern California Association

The Southern California Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, M. Am. Soc. C. E., 514 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

Spokane Association

At its meeting of March 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, C. S. MacCalla; Vice-President, U. B. Hough; Second Vice-President, Morton Macartney; Secretary-Treasurer, A. D. Butler.

Texas Association

At its meeting of December 31st, 1913, the Board of Direction considered and approved the proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Civis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniorforening, Amaliegade 38, Copenhagen, Denmark.

Engineers and Architects Club of Louisville, 1412 Starks Building, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.

Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.

Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.

Engineers' Society of Northeastern Pennsylvania, 415 Washington Avenue, Scranton, Pa.

Engineers' Society of Pennsylvania, 31 South Front Street, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburgh, Pa.

Institute of Marine Engineers, 58 Romford Road, Stratford, London, E., England.

Institution of Engineers of the River Plate, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.

Institution of Naval Architects, 5 Adelphi Terrace, London, W. C., England.

Junior Institution of Engineers, 39 Victoria Street, Westminster, S. W., London, England.

Koninklijk Instituut van Ingenieurs, The Hague, The Netherlands.

Louisiana Engineering Society, Room 6, City Bank and Trust Company Building, New Orleans, La.

Memphis Engineering Society, Memphis, Tenn.

Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.

Montana Society of Engineers, Butte, Mont.

North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, England.

Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.

Oregon Society of Civil Engineers, 605 Spalding Building, Portland, Ore.

Pacific Northwest Society of Engineers, 803 Central Building, Seattle, Wash.

Rochester Engineering Society, Rochester, N. Y.

Sachsischer Ingenieur- und Architekten-Verein, Dresden, Germany.

Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingenieurs Civils de France, 19 rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18–1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From May 6th to July 30th, 1914)

DONATIONS*

FOUNDATIONS OF BRIDGES AND BUILDINGS.

By Henry S. Jacoby, Assoc. Am. Soc. C. E., and Roland P. Davis, Jun. Am. Soc. C. E. Cloth, 9¼ x 6¼ in., illus., 16 + 603 pp. New York and London, McGraw-Hill Book Company, Inc., 1914. $5.00.

In this book, the authors' aim has been, it is stated, to treat the entire subject of foundations for bridges and buildings as represented by American engineering practice, occasional references only being made to foreign practice. The various classes of foundations and their subdivisions are described and illustrated, as well as the general methods of placing them in position, together with notes on some of the special equipment required in the work. The authors state that as young engineers are likely to obtain their early experience with pile foundations, a large proportion of space has been devoted to the various types of piles and to pile-driving, many facts derived from their own experiences being given to illustrate the application of fundamental principles. The attention of teachers in technical schools and colleges is called to the arrangement of topics in the first five chapters, the subject being developed, it is stated, with the idea that the student has had no previous knowledge in regard to it. To supplement the text on that subject, there is a chapter on pneumatic caisson practice by T. Kennard Thomson, M. Am. Soc. C. E. Three chapters on the design of piers and abutments, including the types introduced in recent years, are also given, and there is a chapter containing a large number of classified references to articles on foundations contained in engineering literature. The Contents are: Timber Piles and Drivers; Driving Timber Piles; Bearing Power of Piles; Concrete Piles; Metal and Sheet Piles; Cofferdams; Box and Open Caissons; Pneumatic Caissons for Bridges; Pneumatic Caissons for Buildings; Pier Foundations in Open Wells; Ordinary Bridge Piers; Cylinder and Pivot Piers; Bridge Abutments; Spread Foundations; Underpinning Buildings; Explorations and Unit Loads; Pneumatic Caisson Practice; References to Engineering Literature; Index.

THE EFFICIENT MAN:

For the Use of All Interested in the Training of Minors and Development of Supervisors to Best Manage Men and Work in Commerce, Manufacture, Transportation, and Engineering, to Decrease Cost of Production and Living and Prepare Man to Best Prolong his Young-Old Years of Servient Labor and Proficiency. By Thomas D. West. Cloth, 7¾ x 5¼ in., illus., 330 pp. Cleveland, Ohio, The Gardner Printing Company, 1914. $2.00. (Donated by T. A. Gerblick.)

In the Introduction the author states that in his business experience, he has often felt the need of literature describing, under one cover, the necessary education and training of minors, the deficiencies of "bosses", and giving instructions in labor-saving management, in order to assist operatives, overseers, and instructors to a full development of their efficiency. To that end he has presented, in this book, various suggestions, facts, and plans to aid in bettering the efficiency of operatives and supervisors, and this volume, he states, will have failed completely in its mission if its readers do not concede that by living up to its teachings, man may become more efficient and thereby greatly reduce the present high cost of living. The Contents are: Part I, Intellect, Education, Training, and Managerial Conditions; Part II, The Demerits and Deplorable Efficiency of Supervisors; Part III, Establishing Business, Labor-Saving Management, Disciplining Men, and "Safety First"; Biography of the Author; Index.

THE "MECHANICAL WORLD" ELECTRICAL POCKET BOOK FOR 1913:

A Collection of Electrical Engineering Notes, Rules, Tables and Data. Cloth, 6¼ x 4 in., illus., 310 pp. Manchester, England, Emmott & Company, Limited, 1913. 25 cents. (Donated by Norman, Remington & Co.).

Sixteen pages of new subject-matter have been added, it is stated, to this issue of this popular handbook on electrical engineering and power transmission.

* Unless otherwise specified, books in this list have been donated by the publishers.

Some of the sections have been rewritten, it is said, and expanded, notably those on Dynamos and Motors and Electrical Measuring Instruments. There are also many new sections on such subjects as Magnetic Circuits, Magnetic Materials, Load Factors, Power Factors, Motor Applications, Motor Control by Switches, Fuel in Central Stations, Depreciation, etc. The book, it is stated, has been thoroughly revised and many new illustrations have been added. A partial List of Contents is: Index; Electrical Units; Resistance; Electrolysis; Magnets; Magnetic Circuits and Magnetic Materials; Continuous Current Dynamos and Motors; Alternate-Current Systems; Alternators; Alternating-Current Motors; Methods of Distributing Electrical Energy; Electric Motor Applications; Dynamo and Motor Defects; Motor Starters; Electricity in Coal Mines; Electric Cranes, Lifts, etc.; Electric Welding; Electric Lighting, Heating, etc., etc.

THE "MECHANICAL WORLD" POCKET DIARY AND YEAR BOOK FOR 1914:

A Collection of Useful Engineering Notes, Rules, Tables and Data. Twenty-seventh Year. Cloth, 6¼ x 4¼ in., illus., 443 pp. Manchester, England, Emmott & Company, Limited; Baltimore, Md., Norman & Remington, 1914. 25 cents. (Donated by Norman, Remington & Co.)

In order to increase its value as a practical handbook on mechanical means of transmitting power, prime movers, etc., the subject-matter of this, the twenty-seventh edition of this work, is stated to have been thoroughly revised. Many of the sections have been rewritten and new data and illustrations have been added to them. New sections on Milling and Gear-Cutting, on the Milling Machine, and on Grinding have also been included. The tables are stated to have been re-arranged and new ones giving Dimensions of Keys, Hydraulic Packing, Copper Expansion Joints, etc., have been added. A partial list of Contents is: Index; Steam and the Steam Engine; Steam Turbines; Steam Boilers; Gas Engines; Oil Engines; Suction Gas Producers; Beams and Girders; Shafting; Toothed Gearing; Notes on Milling and Gear Cutting; Notes on Grinding; Verniers and Micrometers; Belting; Rope Driving; Chain Driving; Wire Ropes; Hydraulics; Screw Cutting; Ball Bearings; etc., etc.

MOLDED ELECTRICAL INSULATION AND PLASTICS.

By Emile Hemming. Cloth, 8 x 5¼ in., illus., 207 pp. New York, Ward Clausen Co., 1914. $3.00.

The purpose of this book, the preface states, has been to describe thoroughly and briefly the progress made in the field of molded insulation, embracing as it does a great variety of products differing widely in their characteristics and constituent principles, to trace its development during the last ten years, and to discuss its present status. It is highly important, it is said, that electrical engineers and designers be able to classify the newer materials used for this purpose and to understand their properties; the author, therefore, describes their important basic principles and discusses their favorable and unfavorable characteristics in order to give the engineer an insight into the materials and methods used in their manufacture and to guide him to a proper selection of the type of insulating parts to use in his machine or apparatus. The Contents are: Introduction; What is Molded Insulation?; Molded Insulation Ten Years Ago; Classification of Molded Insulation Used To-day; Raw Materials, etc.; Hot Molded Organic Materials; Cold Molded Organic Materials; Cold Molded Inorganic Materials; Ceramics, Porcelain; Rubber Compounds; Organic Plastics; Synthetic Resinous Materials; Fibre Sheet Materials; Molded Mica; Properties; Molds and Dies; Illustrations of Molded Pieces; Laboratory Tests; Dielectric Strength Tests; Insulation Resistance Tests; Tensile Strength Tests; Arc Tests; Index.

A PRACTICAL TREATISE ON SUB-AQUEOUS FOUNDATIONS

Including the Coffer-Dam Process for Piers and Dredges and Dredging, With Numerous Practical Examples from Actual Work. By Charles Evan Fowler, M. Am. Soc. C. E. Third Edition, Revised and Enlarged. Cloth, 9¼ x 6 in., illus., 43 + 814 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1914. $7.50. (Donated by the Author.)

This edition of this book, it is stated, has been practically rewritten and considerably enlarged by data accumulated during the author's varied practice of more than twenty-six years in all classes of subaqueous foundations for bridges and harbor work. The author has included detailed descriptions of the various types of foundations, materials and methods of construction, different kinds of plant and equipment used in such work, as well as cost estimates of various

works. These chapters are supplemented by subject-matter relating the use of compressed air in caisson work, the cause and cure of caisson disease, the work of divers and the diver's outfit, as well as descriptions, detailed plans, and working drawings of pile-driving outfits, plant accessories, pumping plants, dredges, tugboats, scows, etc., which should make the book a valuable addition to the library of the engineer, architect, and contractor. The Contents are: Historical Development; Construction and Practice—Crib Coffer-Dams; Construction and Practice—Cribs and Canvas; Pile-Driving and Sheet-Piles; Jetting Piles; Construction with Sheet-Piles; Metal Construction; Cylinders and Caissons; Open Dredged Caissons of Timber; Timber Pneumatic Caissons; Steel Pneumatic Caissons, Forth Bridge; Divers and Diving; Removing Old Piles; Pumping and Dredging; Clamshell Dredges; Drill Scows and Rock Breakers; Dipper and Ladder Dredges; Suction and Hopper Dredges; Tugboats and Scows; The Foundation; Location and Design of Piers; Rock Fill Foundations and Quarries; Calculation of Piers, Footings and Retaining Walls; Cement and Concrete; Foundations for Piers and Wharves; Timber Piers and Timber Preservation; Foundations for Dams, Seawalls, and Breakwaters; Foundations for Docks and Locks; Forms of Concrete; Estimating the Cost; Appendices; Index.

ENGINEERING GEOLOGY.

By Heinrich Ries and Thomas L. Watson. Cloth, 9¼ x 6¼ in., illus., 26 + 672 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1914. $4.00.

For some years the authors of this book have been giving special courses in geology as applied to engineering to students of civil engineering at their respective universities, and this book which, it is stated, includes those fundamental principles of geology which relate to engineering problems and the methods followed in teaching such principles, is published with the hope that it will prove useful to those engaged in similar work. In connection with engineering geology, the important questions which the engineer has to consider are stated to be the character of common rocks in their use for building stone and road material; the structure of rocks in relation to tunneling operations, dam and reservoir foundations, landslides, etc.; the geological conditions affecting and controlling underground water supplies; and the relation of soils to sewage disposal and water purification, etc.; and some knowledge of such materials as fuels (coal, oil and gas), clays, cements, etc., is also necessary. Throughout the book emphasis is laid, it is stated, on the practical application of the topics treated to engineering work, and although the book is intended primarily for the civil engineer, it is hoped that it will prove of service to others interested in applied geology. At the end of each chapter, a bibliography of the subject treated of in that chapter, is given. The Chapter headings are: The Rock-Forming Minerals; Rocks, Their General Characters, Mode of Occurrence and Origin; Structural Features and Metamorphism of Rocks; Rock-Weathering and Soils; Surface Water (Rivers); Underground Waters; Landslides and Their Effects; Wave Action and Shore Currents; Lake; Glacial Deposits; Building Stone; Limes, Cement and Plaster; Clay and Clay Products; Coal Series; Petroleum, Natural Gas and Other Hydrocarbons; Road Foundations and Road Materials; Ore Deposits; Appendix A, Geologic Column; Appendix B, Geological Surveys; Index.

THEORY OF ARCHES AND SUSPENSION BRIDGES.

By J. Melan. Authorized Translation by D. B. Steinman, Jun. Am. Soc. C. E. Cloth, 9¼ x 6¼ in., illus., 10 + 303 pp. Chicago, The Myron C. Clark Publishing Co.; London, E. & F. N. Spon, Ltd., 1913. $3.00.

This work comprises, it is stated, a translation of the "Theory of Arches and Suspension Bridges" as it appears in the third enlarged edition of the "Handbuch der Ingenieurwissenschaften", Vol. 2, Part 5, 1906. The translator states that his work was undertaken in order to make this book which has been used so widely by consulting engineers and bridge departments, accessible to the entire Profession in the United States. In it the design of arches and suspension bridges is said to be thoroughly and exhaustively developed, both analytically and graphically, and all types of any importance are considered. The translation has been made, it is stated, without any omissions or changes, except in some examples and tables where the quantities have been converted from metric to English units. The notation has also been changed wherever necessary to conform more closely to our standard symbols, the corresponding changes having been made in the figures and plates, and short explanatory notes have been inserted as aids to American readers with the analytical and graphical devices. An Appendix devoted to the design of masonry and reinforced concrete arches, and an exhaustive bibliography on arches and suspension bridges are also included.

It is hoped that the book will be useful not only as a reference work in the design of higher structures, but as a textbook for advanced or post-graduate students in structural engineering or applied mathematics. The Contents are: Introduction; General Method of Design; The Flexible Arch and the Unstiffened Cable; The Stiffened Suspension Bridge; The Arched Rib; Arch and Suspension Systems with Braced Web; Combined Systems; Appendix: The Elastic Theory Applied to Masonry and Concrete Arches; Remarks on the Temperature Variation to be Assumed in Steel and Masonry Bridges; Bibliography; Index.

STEEL BRIDGE DESIGNING.

By Melville B. Wells. Cloth, 9¼ x 6¼ in., illus., 7 + 260 pp. Chicago, The Myron C. Clark Publishing Co.; London, E. & F. N. Spon, Ltd., 1913. $2.50.

The preface states that this book is intended for use as a textbook in engineering colleges and also as a reference book in the drafting rooms of colleges and bridge offices. In it, the author discusses in detail the location, design, and construction of the various types of steel highway and railroad bridges. The first three chapters are devoted to a general discussion of the subject, and the author recommends a study of them by the student, preliminary to visiting bridge manufacturing plants. A large number of shop and general drawings, representing good American practice in bridge design, have been reproduced in the book, and arranged so that they may be easily referred to by the student. In Chapter XII, Strength of Materials, derivations of the principal formulas used in bridge design are briefly given, together with examples of their application. Chapter XIII contains a concise working bibliography of the subjects treated in the text. The student, it is said, should become familiar with both methods of allowing for impact, that is, by increasing the live load stresses by certain percentages and by allowing only low live load unit stresses, therefore both kinds of specifications are used in the different designs, and the "General Specifications for Steel Railway Bridges" published by the American Railway Engineering Association, is reproduced in full in Chapter XIII. The Chapter headings are: Engineers' Work and Contracts; Bridge Manufacture; Rivets; The Design of a Roof Truss; Types and Details of Highway Bridges; Design of a Riveted Truss Highway Bridge; Types and Details of Railway Bridges; Design of a Plate Girder Railroad Bridge; Design of a Riveted Truss Railroad Bridge; A Pin Connected Bridge; Shop Drawings; Strength of Materials; Bibliography; Specifications for Steel Railroad Bridges; Index.

McGRAW ELECTRIC RAILWAY MANUAL, 1914:

The Red Book of American Electric Railway Investments. Edited by Frederic Nicholas. Twenty-first Annual Number. Cloth, 13 x 10 in., illus., 33 + 351 pp. New York, McGraw Publishing Company, Inc., 1914. $7.50. (Donated by the *Electric Railway Journal.*)

In a secondary title, this book is stated to be a manual of the securities, traffic statistics, earnings, officers, directors and equipment of street and interurban railways of the United States, Canada, Cuba, and the West Indies. This edition, it is stated, has been enlarged to include abbreviated reports of the smaller companies as well as reports of prominent holding companies which control electric railway operating companies, in order that wider comparison of operating results may be shown. The subject-matter is arranged alphabetically by States, cities, and companies, and under each company is given a brief history of that company, its capital stock, funded debt, statistics of operating results, traffic returns, and balance sheet, names and addresses of officers, and locations of general offices, power stations, repair shops, etc. Maps showing the main and connecting lines, as well as the location and nature, of many of the larger companies are included. At the end of the book is a list of street and interurban railway associations, with the names and addresses of their officers. There is also an Index of the railway companies included in the Manual.

ILLINOIS PUBLIC UTILITY COMMISSION LAW AND MUNICIPAL OWNERSHIP LAW:

With Annotations, Marginal Notes, and Index-Digest. By William J. Norton. Cloth, 11 x 8½ in., 200 pp. Chicago, The Author, 1913. $2.00. (Donated by T. H. Flood & Co.).

The preface states that this book is an attempt to supply a well printed, carefully indexed, and classified working copy of the public utility laws of the State of

Illinois. The Index-Digest which is given first, rearranges the law, it is said, in the most logical form, that is, the powers of the commission, the duties of the utilities, the powers of the municipalities and of the public, proceedings before the Courts, and penalties and general provisions. The Laws are said to have been reprinted exactly from the official bills passed by the Legislature, and references are given, in foot notes, to leading Court and commission decisions which are the sources of the law as adopted in Illinois, as well as to comments on that law and on practices and procedures under the laws of other States. The Contents are: Index-Digest; Public Utility Commission Law; Municipal Ownership Law; Indiana "Indeterminate Permit" Law; Alphabetical Index.

COMPRESSED AIR:

A Treatise on the Production, Transmission, and Use of Compressed Air. By Theodore Simons. Cloth, 9¼ x 6¼ in., illus., 11 + 173 pp. New York and London, McGraw-Hill Book Company, Inc., 1914. $1.50.

The author's chief aim in this book, it is stated, is to provide the student and general reader with a working idea of the natural laws and physical principles underlying the production, transmission, and use of compressed air as will enable them to comprehend the construction and operation of the various types of compressors and other appliances used for that purpose. The subject-matter is said to be well within the comprehension of the average technical student who has a sound knowledge of the elements of algebra, physics, and mechanics, the higher mathematics being used only when they lead to a simpler solution of certain problems. Numerous carefully selected problems which the author considers one of the strong features of the book, are included to make clear to the student the meaning and practical application of the principles and laws presented in the text. The subject-matter is divided into four parts, of which Parts I to III, inclusive, relate to the theoretical discussion of the subject. Part IV contains descriptions and illustrations of a few prominent types of compressors for the purpose of demonstrating the practical application of the theoretical principles discussed in the preceding parts. The Contents are: Part I. The Production of Compressed Air; Part II. The Transmission of Compressed Air; Part III, The Use of Compressed Air; Part IV, Air Compressors and Accessories; Appendix: Tables I to IX; Index.

A TREATISE ON THE LAW OF PUBLIC UTILITIES

Operating in Cities and Towns. By Oscar L. Pond. Buckram, 9½ x 6¼ in., 56 + 12 + 954 pp. Indianapolis, The Bobbs-Merrill Company, 1913. $6.00.

In this treatise on the law of municipal public utilities, the author attempts, it is stated, to ascertain both the nature of municipal corporations as expressed in the statute laws and the construction given by the Courts to the powers conferred on the municipality by the State; to discover what limitations are placed on municipal activities by their constitutions as construed by the Courts, and how far such decisions facilitate or impede municipal ownership, operation, or the proper regulation and control of public utilities; and also to ascertain the most efficient methods of regulation and control available to the State or municipality over the operation, by private capital, of municipal public utilities. The laws relating to such utilities, it is said, have been laid down and developed chiefly by Court decisions, which decisions, the author states, constitute the basis and authority for this book, thereby making it an exhaustive, authoritative, and practical consideration of the subject to all who are interested. The Appendix contains the Public Service Laws of New York, Wisconsin, and Indiana. A partial list of Contents is: Introduction; The Two Capacities of Municipal Corporations; Construction of Municipal Charters; What are Municipal Purposes Within the Meaning of the Constitution; The Implied Powers of Municipal Corporations; The Constitutional Limitation of Municipal Indebtedness; The Franchise; No Exclusive Franchise Under Implied Power; No Exclusive Franchise by Implication; Contracts of Municipal Corporations for Public Utility Service; Duration of Franchise; Franchise Rights Available to Inhabitants of Municipalities; No Discrimination in Service; Liability of Water-Works Companies for Fire Loss; Negligence of Municipal Public Utilities; Municipal Public Utility Systems as Additional Servitudes; Exemption from Taxation of Property Supplying Municipal Public Utilities; Sale of Property Providing for Municipal Public Utilities; Rights on Expiration of Forfeiture of Franchise; Street and Highway Privileges of Municipal Public Utilities; The Right to Fix Rates; Rates Must be Reasonable; What Constitutes Reasonable Rates; Valuation of the Investment; etc., etc.

TECHNICAL MECHANICS: STATICS AND DYNAMICS.

By Edward R. Maurer. Third Edition, Rewritten. Cloth, 9½ x 6 in., illus., 7 + 356 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1914. $2.50.

The first edition of this book was published in 1903, but after ten years' use as a textbook in the author's classes, many changes, the preface states, were deemed necessary. Accordingly, the subject-matter was practically rewritten for the present edition and the collection of problems to be solved by students is stated to have been completely changed. The book is intended as a textbook on theoretical mechanics for engineering students and includes, it is stated, those principles of rational mechanics which are especially applicable in various fields of engineering and some of our knowledge of friction. The subject-matter is divided into two parts, Statics and Dynamics, of which the first is said to deal with certain of the circumstances of bodies at rest and the second with those of bodies in motion. The applications, it is stated, have been selected and presented for the purpose of illustrating principles of mechanics and each subject discussed has a direct bearing on some engineering problem. The Contents are: Composition and Resolution of Forces; Forces in Equilibrium; Simple Structures; Friction; Center of Gravity; Suspended Cables; Wires, Chains, etc.; Rectilinear Motion; Curvilinear Motion; Translation and Rotation; Work, Energy, Power; Momentum and Impulse; Two Dimensional (Plane) Motion; Three Dimensional (Solid) Motion; Appendix A, Theory of Dimensions of Units; Appendix B, Moment of Inertia of Plane Areas; Problems; Index.

MODERN CITIES:

Progress of the Awakening for Their Betterment Here and in Europe. By Horatio M. Pollock and William S. Morgan. Cloth, 8½ x 5½ in., illus., 10 + 418 pp. New York and London, Funk & Wagnalls Company, 1913. $1.50.

The authors, in this book, have endeavored, it is stated, to give students and others interested in social progress and civic betterment, a comprehensive view of the best modern features and ideals of municipal life both in the United States and abroad. They have been associated in municipal work and together have visited a number of European cities and towns to observe and investigate municipal conditions and progress. Frequent reference is made in their book to such conditions, it is said, and some of the achievements and problems of European cities are described at length; but the needs of American communities were kept in view and the authors hope that their book will serve as a guide to such communities in their efforts toward civic betterment and upbuilding. The Chapter headings are: The Modern City; City Planning; Home Planning—the Housing Problem; City Streets and Some Splendid Types; The Value of Art in Cities; The Value of Parks; Harbor Development; The Conservation of Human Life; Municipal Government; Municipal Home Rule; The Selection of City Officers and Employees; The Control of Municipal Public Service Corporations; Recent Developments in Education; Religion and Municipal Life; The Social Evil; Conditions and Methods of Social Progress in American Cities; Appendix; Index.

Gifts have also been received from the following:

Alabama-State Highway Dept. 1 pam.
Alabama Polytechnic Inst. 2 vol.
Alaska Mexican Gold Min. Co. 1 pam.
Alaska Treadwell Gold Min. Co. 1 pam.
Alaska United Gold Min. Co. 1 pam.
Albany, N. Y.-Bureau of Water. 1 pam.
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Am. Road Builders' Assoc. 1 vol.
Am. Soc. of Municipal Impvts. 1 bound vol.
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California-Agri. Exper. Station. 2 pam.
California-Dept. of State. 1 pam.
California-R. R. Comm. 1 bound vol., 13 pam.
California-State Water Comm. 2 pam.
California, Univ. of. 3 vol., 7 pam.
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BLAIR, MCCREA PARKER. City Engr., St. Boniface, Man., Canada	Assoc. M.	Feb. 2, 1909
	M.	May 6, 1914
BLANCHARD, ARTHUR CLARENCE DOUGLAS. Asst. to Chf. Engr., Greater Winnipeg Water Dist., 901 Boyd Bldg., Winnipeg, Man., Canada	Assoc. M.	April 5, 1910
	M.	June 24, 1914
BROWNELL, JAMES PARKER. Engr. (Eaton & Brownell), Carthage, N. Y		June 24, 1914
CAMERON, JOHN BOBBS. Div. Engr., B. & O. R. R., 416 Euclid Ave., New Castle, Pa.	Jun.	Oct. 2, 1900
	Assoc. M.	Feb. 3, 1904
	M.	June 24, 1914
CLARKE, ELWYN LORENZO. Civ. and Hydr. Engr., Box 587, Sheridan, Wyo	Assoc. M.	April 1, 1908
	M.	May 6, 1914
COLLIER, WILLIAM NEVILLE. Supt. of Constr., U. S. Public Bldgs., Room 144, Post Office Bldg., Boston, Mass	Assoc. M.	May 2, 1911
	M.	June 24, 1914
COMBER, WILLIAM GEORGE. Res. Engr., Dredging Div., The Panama Canal, Paraiso, Canal Zone, Panama		June 24, 1914
CORNS, HARRY COOPER. R. F. D. No. 1, Cypress, Ind		June 24, 1914
CROWNOVER, CHARLES ELMER. Project Engr., U. S. Reclamation Service, Meadow Creek, Wash		June 24, 1914
DAAE, HANS ANDREAS. Contr. Engr., Clarke & Henery Constr. Co., 1615 Eighth St., Sacramento, Cal	Assoc. M.	June 30, 1911
	M.	June 24, 1914

MEMBERS (*Continued*)		Date of Membership.
DALES, OLIVER DEAN. Const. Engr., Hydraulic Power Co., 552 Tenth St., Niagara Falls, N. Y.		June 24, 1914
DENNIS, HARRY WHITING. Constr. Engr., Southern California Edison Co., 329 South Reno St., Los Angeles, Cal.	Assoc. M.	Oct. 2, 1907
	M.	May 6, 1914
EDDY, CHARLES WELLS. Res. Engr., Waterbury Water Supply, Thomaston, Conn.	Assoc. M.	Mar. 2, 1909
	M.	June 24, 1914
ELLIOTT, GEORGE ALEXANDER MILLER. Engr. and Supt., Operation and Maintenance, Spring Val. Water Co., 1270 Sacramento St., San Francisco, Cal.	Assoc. M.	Sept. 5, 1911
	M.	June 24, 1914
FREDERICK, FLOYD WILLIS. Mech. Engr., The Underwriters' Laboratories, Inc., 207 East Ohio St., Chicago, Ill.		June 24, 1914
GAY, FREDERICK WALDO. Mech. Engr., J. G. White Eng. Corporation, Room 1100, Garland Bldg., Los Angeles, Cal.		Dec. 31, 1913
GORDON, FRED FORCE. Civ. Engr., Eastman Kodak Co., 75 South Union St., Rochester, N. Y.		May 6, 1914
GORE, ELBERT BRUTUS. Member, Board of Water Engrs., State of Texas, Capitol Station, Austin, Tex.		Dec. 31, 1913
GOW, CHARLES RICE. Civ. Engr. and Contr. (Charles R. Gow Co.), 25 Montview St., West Roxbury, Mass.	Assoc. M.	June 1, 1904
	M.	May 6, 1914
GROVER, NATHAN CLIFFORD. Chf. Hydr. Engr., U. S. Geological Survey, Washington, D. C.	Assoc. M.	Mar. 2, 1904
	M.	May 6, 1914
HANSELL, WILLIAM ALBERT. Asst. Chf. of Constr., City of Atlanta, 630 Highland Ave., Atlanta, Ga.	Assoc. M.	Oct. 5, 1909
	M.	Feb. 4, 1914
HAWLEY, GEORGE PRINCE. Res. Engr., Cedars Rapids Mfg. & Power Co., Cedars, Que., Canada	Assoc. M.	Feb. 6, 1901
	M.	June 24, 1914
HEYWORTH, JAMES ORMEROD. Engr. and Contr., Harvester Bldg., Chicago, Ill.		May 6, 1914
HUFF, CLYDE LESLIE. Town Engr., Athabasca, Alberta, Canada	Assoc. M.	July 1, 1909
	M.	May 6, 1914
HUNTINGTON, LINN MURDOCH. Vice-Pres. and Gen. Mgr., Bramon Estates Co., Hacienda Bramon, Rubio, Venezuela	Jun.	May 2, 1905
	Assoc. M.	Aug. 31, 1909
	M.	Dec. 31, 1913
LAMONT, CLARENCE BOOTH. Asst. to Pres., Seattle Constr. & Dry Dock Co. (Res., 1414 East Roy St.), Seattle, Wash.	Assoc. M.	May 4, 1909
	M.	June 24, 1914
LAURGAARD, OLAF. Project Engr., Tumalo Irrig. Project, State of Oregon, Laidlaw, Ore.	Assoc. M.	June 1, 1909
	M.	May 6, 1914

MEMBERS (*Continued*)

		Date of Membership.
LEAKE, BOUDINOT GAGE. Civ. Engr. and Archt. (Miller, Pollard & Leake), Room 20, Dundee Bldg., Fort Worth, Tex.	Jun.	Jan. 5, 1904
	Assoc. M.	May 3, 1905
	M.	May 6, 1914
LEE, GEORGE ALLEN. Engr., Bluff Harbour Board, Bluff, New Zealand		Dec. 31, 1913
LOEWENSOHN, DAVID. Dept. Engr., Improved Water-Works of Akron, Kent, Ohio		June 24, 1914
LYON, GEORGE JOHN. Asst. Engr., U. S. Geological Survey; Cons. Engr.; Asst. Prof. of Civ. Eng., Union Coll., 209 Eng. Bldg., Union Coll., Schenectady, N. Y.		June 24, 1914
MACARTNEY, MORTON. City Engr., 2215 Maxwell Ave., Spokane, Wash.	Assoc. M.	Mar. 2, 1909
	M.	May 6, 1914
MCCLINTOCK, JAMES ROBINSON. Member of Firm, George W. Fuller, 170 Broadway, New York City	Jun.	Oct. 2, 1906
	Assoc. M.	May 3, 1910
	M.	June 24, 1914
MCCORMICK, HERBERT GRANVILLE. With U. S. Engr. Dept., on River Impvt., Heidelberg, Ky.	Assoc. M.	April 1, 1908
	M.	June 24, 1914
MAITLAND, GEORGE FORREST. Div. Engr., U. P. R. R., Cheyenne, Wyo.		May 6, 1914
MANTON, ARTHUR WOODROFFE. 10 Victoria St., London, S. W., England		Dec. 31, 1913
MARSHALL, THOMAS WORTH. Cons. Engr., 729 Fifteenth St., N. W., Washington, D. C.	Assoc. M.	June 3, 1908
	M.	June 24, 1914
MEEKER, ROBERT ANDERSON. State Highway Engr., Plainfield, N. J.		May 6, 1914
MONROE, JULIUS KEMBLE. Senior Res. Engr., Hydro-Elec. Co. of West Virginia, Bruceton Mills, W. Va.		May 6, 1914
MORTIMER, JAMES DANIEL. Pres., The North American Co., 30 Broad St., New York City		June 24, 1914
OBREITER, JOSEPH WILLIAM. 15 Exchange Pl., Jersey City, N. J.	Assoc. M.	Nov. 6, 1907
	M.	June 24, 1914
PALMER, GEORGE FREDERICK. Res. Engr., Norton Griffiths & Co., Ltd., The Harbor Works, St. John, N. B., Canada		June 24, 1914
PILLSBURY, GEORGE BIGELOW. Maj., Corps of Engrs., U. S. A., U. S. Engr. Office, New London, Conn.	Assoc. M.	Dec. 7, 1904
	M.	June 24, 1914
PINSON, JOSIAH FOWLER. Asst. Engr., Bridges and Bldgs., C., M. & St. P. Ry., 621 White Bldg., Seattle, Wash.		June 24, 1914
RAMSBOTHAM, JOSHUA FIELDEN. Director of Lighthouses to Commonwealth of Australia, Spring St., Melbourne, Victoria, Australia	Assoc. M.	Oct. 31, 1911
	M.	April 1, 1914

MEMBERS (*Continued*)		Date of Membership.
REED, HENRY BUDD. Pres., Brothers Val. Coal Co. of McDonaldton, Pa., 90 West St., New York City		June 24, 1914
RHEA, FRANK. Dist. Engr., Eastern Dist., Div. of Valuation, Interstate Commerce Comm., Washington, D. C.		May 6, 1914
RIEGLER, LOUIS JOHN. Engr., Pennsylvania Co., Pittsburgh (Res., 7028 Church St. (Ben Avon), Bellevue), Pa	Assoc. M. M.	Sept. 3, 1902 June 24, 1914
SAYERS, EDWARD LAWRENCE. Care, New River Co., Macdonald, W. Va	Jun. Assoc. M. M.	Feb. 2, 1904 Jan. 3, 1911 June 24, 1914
SEDDON, WILLIAM LITTLE. First Asst. to Pres., Seaboard A. L. Ry., Royster Bldg., Norfolk, Va		May 6, 1914
SHELLEY, HENRY THOMAS. Asst. Engr. in Chg. of Sewer Constr., City of Philadelphia, 1704 West Tioga St., Philadelphia, Pa		May 6, 1914
SIDENIUS, HARRY. Res. Engr., C. P. Ry., Dept. of Natural Resources, Calgary, Alberta, Canada	Assoc. M. M.	Jan. 2, 1912 June 24, 1914
SLOCUM, HARRY SPENCER. Mech. Engr., Cedars Rapids Mfg. & Power Co., Cedars, Que., Canada	Assoc. M. M.	Nov. 1, 1910 June 24, 1914
STEVENS, HAROLD CONVERSE. Cons. and San. Engr. (Johnson & Fuller), 150 Nassau St., New York City	Assoc. M. M.	June 30, 1910 June 24, 1914
STINCHCOMB, WILLIAM ALBERT. County Surv., Cuyahoga County, 10410 Lake Ave., N. W., Cleveland, Ohio		June 24, 1914
STORER, STACY STEWARD. Chf. Engr., Capitol Steel & Iron Co., Y. M. C. A., San Antonio, Tex	Assoc. M. M.	Nov. 4, 1908 May 6, 1914
TALBERT, CHARLES MASON. Street Commr., 322 City Hall, St. Louis, Mo		Mar. 4, 1914
THOMAS, EDGAR BRANSON. Asst. Engr., in Chg. of River and Harbor Dept., Office of City Civ. Engr. (Res., 11417 Glenwood Ave., S. E.), Cleveland, Ohio	Assoc. M. M.	June 3, 1908 June 24, 1914
VAN DUYNE, JOHN RALPH. Div. Engr., Passaic Val. Trunk Sewer, 820 Essex Bldg., Newark, N. J		June 24, 1914
WADHAMS, JOSEPH PALMER. Asst. Engr., Elec. Traction, McHenry & Murray, 33 Howe St., New Haven, Conn	Assoc. M. M.	Oct. 31, 1911 June 24, 1914
WARREN, JAMES GOOLD. Col., Corps of Engrs., U. S. A., 540 Federal Bldg., Buffalo, N. Y		June 24, 1914
WELLS, DALTON RUSSELL. Archt. and Engr., 1602 Ford Bldg., Detroit, Mich		June 24, 1914

MEMBERS (*Continued*)

		Date of Membership.
WHITMAN, RALPH. Asst. Civ. Engr., U. S. N., U. S. Naval Academy, Annapolis, Md	Assoc. M.	Nov. 6, 1907
	M.	June 24, 1914
WILDER, CLIFTON WHITE. Elec. Engr., Public Service Comm., First Dist., State of New York, 154 Nassau St., New York City	Assoc. M.	Oct. 3, 1911
	M.	June 24, 1914
WILLIAMS, MARSHALL. Operating Mgr., Pittsburgh Div., Am. Bridge Co., 6105 Howe St., Pittsburgh, Pa		June 24, 1914
WINSLOW, FREDERIC IRVING. Engr. of Extension, Water Service, Public Works Dept., 44 City Hall, Boston, Mass		May 6, 1914
WOODARD, WILKIE. Civ. and Landscape Engr., 441 Consolidated Realty Bldg., Los Angeles, Cal	Assoc. M.	May 4, 1904
	M.	May 6, 1914

ASSOCIATE MEMBERS

ALLEN, COVINGTON KENNEDY. Res. Engr., Fallsway Viaduct, City Engr.'s Dept., 2728 Maryland Ave., Baltimore, Md		June 24, 1914
ANCONA, JOHN FLINN. Engr., Design and Constr., Eastman Kodak Co., 190 Birr St., Rochester, N. Y		May 6, 1914
BANDY, EDWARD LEE. Concrete Insp., Fla. East Coast Ry., Long Key, Fla		June 24, 1914
BECK, EDWARD ADAM. Mgr., Borough of Edgeworth, Pa., 100 Pine Rd., Sewickley, Pa		May 6, 1914
BECKJORD, JESSEE GARNET. Care, California State Highway Comm., Rialto Bldg., San Francisco, Cal		Dec. 31, 1913
BENSON, CHARLES GREENWOOD. 341 Bryant St., N. W., Washington, D. C		May 6, 1914
BERTHE, LUCIUS TULLIUS. 215 Charleston Bank Bldg., Charleston, Mo		May 6, 1914
BILYEU, CHARLES SMITH. New York Representative, Colby & Christie, 51 East 42d St., New York City	Jun.	Dec. 1, 1908
	Assoc. M.	Dec. 31, 1913
BROWNE, JAMES GIBBONS. Cons. and Const. Engr., Navasota, Tex		May 6, 1914
BRYAN, CLARK ALBERT. Res. Engr., Carlisle, Pennsylvania, Sewerage Comm., 41 West High St., Carlisle, Pa		Feb. 4, 1914
BUCHANAN, NATHAN BOOKER. City Engr.; Secy. and Treas., The Tulepo Eng. Co., Inc., Tulepo, Miss	Jun.	Mar. 1, 1910
	Assoc. M.	April 1, 1914
BUSHNELL, HOWARD BLAINE. Div. Engr., State Highway Dept., Springfield, Ill		May 6, 1914

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
BUSHWAY, WALTER BENJAMIN. Engr. and Agt., Boston Dwelling House Co., Boston (Res., 316 Hyde Park Ave., Jamaica Plain), Mass.	Jun.	Nov. 8, 1909
	Assoc. M.	May 6, 1914
BUTTERWORTH, ASA CLAIR. Vice-Pres., Miller Eng. Co., 823 Southern Trust Co. Bldg., Little Rock, Ark.		May 6, 1914
CARPENTER, JAMES WILHELM. Field Engr., The Cleveland Elec. Illuminating Co., 11508 Ashbury Ave., Cleveland, Ohio.	Jun.	Feb. 28, 1911
	Assoc. M.	June 24, 1914
CHAMBERLIN, EDWARD CARTER. Res. Engr., F. T. Crowe & Co., 45 Fourth St., Portland, Ore.		Feb. 4, 1914
CHAMBERLIN, JOHN ROSS. Deputy State Highway Commr., Hartman Bldg., Columbus, Ohio.		May 6, 1914
CHURCH, ELIHU CUNYNGHAM. Engr., Marconi Wireless Telegraph Co., Woolworth Bldg. (Res., 4 East 130th St.), New York City.	Jun.	May 1, 1906
	Assoc. M.	June 24, 1914
CLARKSON, CHARLES DANA SAYRES. Civ. and Min. Engr. (Brown & Clarkson), Star Bldg., Washington, D. C.		April 1, 1914
CLOSSON, WILLIAM GIDEON. Asst. Engr., Div. of Substructures, Borough President's Office, 1061 East 10th St., Brooklyn, N. Y.		May 6, 1914
COLLINS, JERRY. Supt., The Dock Contractor Co., Hoboken, N. J., 546 West 124th St., New York City.		June 24, 1914
CONNER, CARLTON NUDD. Junior Engr., U. S. A., 305 P. O. Bldg., Wheeling, W. Va.		June 24, 1914
CUMMIN, GAYLORD CHURCH. City Engr., City Bldg., Dayton, Ohio.		May 6, 1914
DOELEMAN, HERMAN FRANÇOIS. Cons. Engr., 614 American Bldg., Baltimore, Md.		June 24, 1914
DUBOIS, GUSTAVO ADOLFO. Director of San Eng., Republic of Cuba, Calle 17, No. 10 esq á M., Havana, Cuba.	Jun.	Sept. 1, 1908
	Assoc. M.	May 6, 1914
FOURMY, JAMES MCCARDELL. Locating and Const. Engr., Chattanooga Traction Co., Care, Signal Mountain Inn, Chattanooga, Tenn.		June 24, 1914
GILLESPIE, CHESTER GORDON. Res. Engr., Evanston Filter Plant Constr., 1418 Howard St., Rogers Park, Chicago, Ill.	Jun.	Sept. 6, 1910
	Assoc. M.	May 6, 1914
GOETHALS, GEORGE RODMAN. First Lieut., Corps of Engrs., U. S. A., West Point, N. Y.	Jun.	July 9, 1912
	Assoc. M.	April 1, 1914
GOLDBECK, ALBERT THEODORE. Engr. of Tests, Philadelphia, Municipal Testing Laboratory, 4104 Westminster Ave., Philadelphia, Pa.		May 6, 1914

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
GREEN, FREDERICK WILLIAM. Gen. Mgr., Louisiana & Arkansas Ry., Box 345, Stamps, Ark.	Assoc. Assoc. M.	May 1, 1907 June 24, 1914
GREGSON, ALVERO CHARLES. With S. Pearson & Son, Inc., 43 Hillside Ave., Flushing, N. Y.	Jun. Assoc. M.	May 4, 1909 May 6, 1914
GRINDROD, IRVIN SUTTON. 33d and Clearfield Sts., Philadelphia, Pa.	Jun. Assoc. M.	Feb. 2, 1909 June 24, 1914
HALL, GILBERT G. City Engr., South Bend, Wash.		May 6, 1914
HAMILTON, EDWARD PARMELEE. With John Wiley & Sons, Scientific Publishers, 432 Fourth Ave., New York City.	Jun. Assoc. M.	April 6, 1909 June 24, 1914
HEISER, ALFRED BRACKENRIDGE. Designing Engr., Turner Constr. Co., 11 Broadway, New York City (Res., 189 Windsor Pl., Brooklyn, N. Y.)	Jun. Assoc. M.	Nov. 1, 1910 June 24, 1914
HICKEY, LOUIS THOMAS FRANKLIN. Civ. and Hydr. Engr., 422 Montgomery St., San Francisco, Cal.		June 24, 1914
HILL, WILLIAM ANDREW. Res. Engr., Lockwood, Greene & Co., South Barre, Mass.		June 24, 1914
HOLBROOK, ARTHUR RAYMOND. Asst. Engr., Board of Water Supply, 22d Floor, Municipal Bldg., New York City.	Jun. Assoc. M.	April 2, 1907 May 6, 1914
HOLLAND, RAY KINGSBURY. Prin. Asst. Engr., Gardner S. Williams, 217 North Ingalls St., Ann Arbor, Mich.		June 24, 1914
HOWES, CYRUS PIERCE. Asst. Engr., Brazil Ry., Bridge Dept., São Paulo, Brazil.	Jun. Assoc. M.	May 4, 1909 Mar. 4, 1914
IMMICH, HOLLIS DOUGLASS. With Lewis A. Miller, 161 Curtis St., Meriden, Conn.		June 24, 1914
JONES, PERCY FRANCIS. Millbrae, Cal.		Feb. 4, 1914
JOYCE, WALTER EDWARD. Asst. Engr., H. D. Robinson, 411 Dorchester St., West, Montreal, Que., Canada.		June 24, 1914
KALLASCH, WINFRED MILLER. Supt., Leonard Constr. Co., Box 93, Tiltonville, Ohio.		May 6, 1914
KANE, WALTER WARD. Engr. of Constr., Dept. of Streets and Highways, 3 Leslie St., Newark, N. J.		June 24, 1914
KATIGBAK, JOSÉ PETRONIO. First Asst. City Engr., Dept. of Eng. and Public Works, City Hall, Manila, Philippine Islands.		April 1, 1914
KINGSCOTT, WALTER JOHN. Bear Lake, Mich.		June 24, 1914
KLINGNER, LOUIS WILLIAM. Company Engr., The Dominion Constr. Co., Ltd., Belleville, Ont., Canada.	Jun. Assoc. M.	Oct. 31, 1911 June 24, 1914
LANE, JOHN HAROLD. Asst. Engr., Bridge Dept., N. W. Pac. R. R., 417 Fair Oaks St., San Francisco, Cal.		June 24, 1914

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
LAYLIN, JOHN. City Engr., Norwalk, Ohio		Mar. 4, 1914
LEMBERGER, OTTO. 46 Schottenfeldgasse, Vienna VII, Austria		Nov. 12, 1913
LEWIS, WASHINGTON BART. 810 Nineteenth St., Parkersburg, W. Va		Dec. 31, 1913
LOEWE, DAVID LUDWIG. Care, Arnhold, Karberg & Co., Shanghai, China		April 1, 1914
LYNDE, HARRY MILTON. Drainage Engr., Office of Experiment Stations, U. S. Dept. of Agriculture, West Raleigh, N. C.	Jun. Assoc. M.	April 4, 1911 April 1, 1914
MACK, GEORGE HORACE. Contr. and Builder (C. O. Mack & Son), Lock Box 753, Hampton, Iowa	Jun. Assoc. M.	Sept. 6, 1910 June 24, 1914
MCCANN, WILLIAM RAY. 1833 Kenilworth Ave., Chicago, Ill		May 6, 1914
MCDOWELL, FLOYD FRANCIS. Asst. Engr., Bureau of Highways, Borough of the Bronx, New York City, 152 Lee Ave., Yonkers, N. Y.		May 6, 1914
MADDOCK, THOMAS. Engr., Saginaw Manistee Lumber Co.; Engr. and Contr., Williams, Ariz		June 24, 1914
MASHBURN, LEON WADDELL. Chf. Engr., Southern Eng. Co., Tunica, Miss		May 6, 1914
MATHEWS, EDWARD GILBERT. Vice-Pres., United Fireproofing Co., 1133 Broadway, New York City (Res., 18 Lefferts Pl., Brooklyn, N. Y.)		June 24, 1914
MICHAEL, HERBERT LEDLIE. First Asst. Engr., New York State Dept. of Highways, 451 Oakwood Ave., East Aurora, N. Y.		June 24, 1914
MILLER, PAUL BERTOLET. 308 First National Bank Bldg., Houston, Tex		May 6, 1914
MOORE, ARTHUR ROLAND. Res. Engr., Kettle Val. Ry., Kelowna, B. C., Canada		May 6, 1914
MUIR, JAMES CECIL. Asst. Engr., F. L. Smidth & Co., 50 Church St., New York City		Feb. 4, 1914
MURPHY, JOSEPH LINCOLN. Chf. Engr., New York Coal Co., Nelsonville, Ohio		May 6, 1914
NALDER, WILLIAM HENRY. Asst. Engr., U. S. Reclamation Service, Fort Shaw, Mont		April 1, 1914
NORDWELL, ALFRED WORCESTER. With Eng. Dept., Board of State Harbor Commrs., San Francisco (Res., 18 Lake Ave., Piedmont), Cal	Jun. Assoc. M.	June 1, 1909 June 24, 1914
OLDS, THOMAS HARTMAN. Care, São Paulo Elec. Co., 34 Bishopsgate St., Threadneedle House, London, E. C., England		May 6, 1914

ASSOCIATE MEMBERS (*Continued*)

	Date of Membership.
PETIT, CHARLES WESLEY. Ventura, Cal	May 6, 1914
PIEPMEIER, BION HARMAN. Div. Engr., Illinois Highway Comm., Springfield, Ill	May 6, 1914
POND, FREDERICK HENRY. Asst. Engr., Board of Water Supply, City of New York, 44 Seventh Ave., Brooklyn, N. Y	May 6, 1914
PRATT, RICHARD ALEXANDER. Engr., A. M. Hewes & Co., 1517 Monadnock Bldg., Chicago, Ill	June 24, 1914
PUFF, CHARLES FREDERICK, JR. 5125 North 15th St., Philadelphia, Pa	April 1, 1914
RABINOWITZ, LOUIS. 25 East 99th St., New York City	June 24, 1914
RATHBUN, JOHN CHARLES. Care, Bureau of Public Works, Manila, Philippine Islands	Jun. Oct. 6, 1908 Assoc. M. May 6, 1914
RENNELL, HENRY HURD. Secy. and Treas., Rennell Constr. Co., Inc., 30 Church St., Room 304, New York City	Jun. Mar. 3, 1908 Assoc. M. June 24, 1914
ROPES, ELIHU HARRISON. Civ. Engr., U. S. Life-Saving Service, Treasury Dept., Washington, D. C	June 24, 1914
SCHICK, HERMAN SCHOVE. 1322 Avenue R, Brooklyn, N. Y.	May 6, 1914
SEAGE, CLARENCE EDMUND. Asst. Engr., New York Connecting R. R., 45 Crescent Ave., New Brighton, N. Y.	April 1, 1914
SHAW, WALTER FARNSBY. Asst. Engr., Dept. of State Engr. and Surv., Barnevald, N. Y	Jun. Jan. 4, 1910 Assoc. M. May 6, 1914
SISSON, FREDERICK PARDON. Asst. Engr., G. T. Ry., Brush St. Depot, Detroit, Mich	May 6, 1914
SLATER, WILLIS APPLEFORD. 300 Laboratory of Applied Mechanics, Urbana, Ill	June 24, 1914
SMITH, WILLIAM WOOD. Asst. Engr., G. T. Ry., 407 Grand Trunk Bldg., Montreal, Que., Canada	May 6, 1914
SOLA, FRANCISCO JOSÉ DE. Asst. Chf. Engr. and Director of Sales, American Steel Co. of Cuba, Empedrado 17, Havana, Cuba	June 24, 1914
STEVENS, CHARLES HENRY. Head Draftsman, Dept. of City Transit, 5918 North Park Ave., Philadelphia, Pa	May 6, 1914
STEVENS, WILLIAM WENTWORTH. Chf. of Constr. Party, Standard Oil Co., Shanghai, China	June 24, 1914
STOCKER, LESLIE WRIGHTSON. Asst. City Engr., 1280 Page St., San Francisco, Cal	June 24, 1914
STOREY, FRANKLIN STEVENS. Gen. Supt., Phœnix Constr. Co., 41 Park Row, New York City	May 6, 1914
TAY, SAMUEL WRIGHT. San. Engr., Territorial Board of Health of Hawaii, Honolulu, Hawaii	June 24, 1914

ASSOCIATE MEMBERS (*Continued*)

		Date of Membership.
THOMPSON, WILLIAM GEORGE BOLAND. Supt., Atlantic Terminals, Cristobal Coaling Station, Cristobal, Canal Zone, Panama		Feb. 4, 1914
TIPPET, HENRY JACKSON. Engr., M. of W., British Columbia Elec. Ry., Ltd., Vancouver, B. C., Canada		Mar. 4, 1914
TORRALBAS, RAFAEL JOAQUIN. Asst. Engr., City Water Supply and Sewers Dept., 75 East Palma, Vibora, Havana, Cuba.	Jun. Assoc. M.	Nov. 1, 1910 June 24, 1914
TREVARTHEN, DWIGHT CUTLER. U. S. Insp., in Chg., Constr. of Dam No. 5, Coosa River, Lincoln, Ala		June 24, 1914
TURNER, HOWARD MOORE. Turners Falls, Mass		April 1, 1914
VANDEVANTER, ELLIOTT. Superv. Engr., Claiborne Johnston & Co., 1006 Worden St., Baltimore, Md	Jun. Assoc. M.	June 6, 1911 June 24, 1914
VINCENT, WILLIAM HUBERT. Asst. Engr., New Orleans Sewerage and Water Board, Room 506, City Hall Annex, New Orleans, La		Dec. 3, 1913
VOGEL, JOHN LEONARD. Asst. Engr., Public Utility Comm., State of New Jersey, 163 Clinton Ave., Jersey City, N. J.	Jun. Assoc. M.	Nov. 5, 1907 May 6, 1914
VOLLMER, HENRY GODLOVE. City Engr., 301 South 10th St., Burlington, Iowa		June 24, 1914
VOORHEES, ISAAC SPURR. Asst. Engr., U. S. Reclamation Service, Hermiston, Ore		June 24, 1914
WALKER, HARRY BRUCE. State Drainage and Irrig. Engr., Office of State Engr., Manhattan, Kans		June 24, 1914
WEEKS, GAYLORD D. Chf. Engr., Jarrett-Richardson Paving Co., 710 Woodruff Bldg., Springfield, Mo		June 24, 1914
WHITNEY, GILBERT CLINTON. Asst. Engr., Elec. Zone Impvts., N. Y. C. & H. R. R. R., 1612 Grand Central Terminal, New York City		June 24, 1914
WHITTEMORE, LESLIE CLIFFORD. Res. Engr., The San. Dist. of Chicago, 700 Karpen Bldg., Chicago, Ill	Jun. Assoc. M.	May 3, 1910 June 24, 1914
WILKES, JOHN. Room 1, Berry Block, Nashville, Tenn		Feb. 4, 1914
WILLARD, ERNST VICTOR. Acting State Drainage Engr., Old Capitol Bldg., St. Paul, Minn		May 6, 1914
WOOD, BENJAMIN RUSSELL. Asst. Engr., U. S. Eng. Dept., U. S. Engr. Office, P. O. Box 155, Manila, Philippine Islands		April 1, 1914
WOODWARD, GUY ERIC. Care, U. S. Reclamation Service, Camp No. 2, Babb, Mont		May 6, 1914
WUTH, BERTHOLD. Care, County Surv., Court House, Oakland, Cal		April 1, 1914

ASSOCIATES

	Date of Membership.
AILES, EDWARD HOFFMAN. Supt., Texas Bitulithic Co., Corpus Christi, Tex	Feb. 4, 1914
BOWERS, NATHAN ABBOTT. 502 Rialto Bldg., San Francisco, Cal	May 6, 1914

JUNIORS

AHRENS, ALBERT RICHARD NELSON. Computer and Designer with Nicholas S. Hill, Jr., 1630 Eleventh Ave., Brooklyn, N. Y	June 24, 1914
ALGER, RALPH TISDALE. Asst. Engr., Akron Improved Water-Works, Filtration Div., 127 Brady St., Kent, Ohio	June 24, 1914
BARCLAY, ARTHUR JACKSON. 359 Park St., Elgin, Ill	June 24, 1914
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BOYNTON, ROBERT HAMMOND. City Engr., Frankfort, Ind	May 6, 1914
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RAPELLI-OLIVER, GEORGE WASHINGTON. 963 Pueyrredon, Buenos Aires, Argentine Republic.	Mar. 4, 1914
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ASSOCIATE MEMBERS	Date of Resignation.
GAY, LEON LINCOLN	May 6, 1914
PETTEBONE, LAUREN AUGUSTUS	May 6, 1914
JUNIORS	
BARTHOLOMEW, TRACY	May 6, 1914

DEATHS

ALBREE, RALPH. Elected Junior, October 4th, 1898; Associate Member, October 1st, 1902; died February 16th, 1914.

BUFFINTON, BENJAMIN THOMAS. Elected Associate Member, September 7th, 1904; Member, January 3d, 1907; died July 6th, 1914.

COOK, HORACE ARTHUR. Elected Associate Member, May 3d, 1910; died May 17th, 1914.

COUCHOT, GEORGE JOHN. Elected Associate Member, May 3d, 1910; died May 3d, 1914.

CROSBY, HORACE. Elected Member, February 17th, 1869; died July 24th, 1914.

FERRIS, JAMES JOSEPH. Elected Associate, July 10th, 1907; Member, September 3d, 1912; died May 15th, 1914.

FRANCIS, CHARLES. Elected Member, May 4th, 1892; died April 29th, 1914.

GARDNER, MARTIN LUTHER. Elected Associate Member, September 2d, 1891; Member, March 4th, 1896; died May 14th, 1914.

GATES, WARREN AUSTIN. Elected Junior, June 30th, 1911; died May 24th, 1914.

HAYNES, CLAUDE SANFORD. Elected Associate Member, January 4th, 1910; died May 4th, 1914.

HURD, HURD CLARENCE. Elected Member, July 2d, 1913; died July 8th, 1914.

LANT, FRANK PARSONS. Elected Junior, October 3d, 1888; Member, February 1st, 1910; died June 30th, 1914.

MATSON, JESSE SIDWELL. Elected Associate Member, July 1st, 1908; died July 4th, 1914.

PRITCHARD, PHILIP MORRIS. Elected Associate Member, June 6th, 1900; died July 8th, 1914.

TURNER, NATHANIEL. Elected Member, March 6th, 1895; died January 19th, 1914.

Total Membership of the Society, August 6th, 1914, 7 541.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(May 6th to July 23d, 1914)

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In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

(1) *Journal*, Assoc. Eng. Soc., Boston, Mass., 30c.
(2) *Proceedings*, Engrs. Club of Phila., Philadelphia, Pa.
(3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
(4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
(5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
(6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
(7) *Gesundheits Ingenieur*, München, Germany.
(8) *Stevens Institute Indicator*, Hoboken, N. J., 50c.
(9) *Engineering Magazine*, New York City, 25c.
(11) *Engineering* (London), W. H. Wiley, New York City, 25c.
(12) *The Engineer* (London), International News Co., New York City, 35c.
(13) *Engineering News*, New York City, 15c.
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(15) *Railway Age Gazette*, New York City, 15c.
(16) *Engineering and Mining Journal*, New York City, 15c.
(17) *Electric Railway Journal*, New York City, 10c.
(18) *Railway Review*, Chicago, Ill., 15c.
(19) *Scientific American Supplement*, New York City, 10c.
(20) *Iron Age*, New York City, 20c.
(21) *Railway Engineer*, London, England, 1s. 2d.
(22) *Iron and Coal Trades Review*, London, England, 6d.
(23) *Railway Gazette*, London, England, 6d.
(24) *American Gas Light Journal*, New York City, 10c.
(25) *Railway Age Gazette*, Mechanical Edition, New York City, 20c.
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(29) *Journal*, Royal Society of Arts, London, England, 6d.
(30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium, 4 fr.
(31) *Annales* de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand, Brussels, Belgium, 4 fr.
(32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
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(34) *Portefeuille Économiques des Machines*, Paris, France.
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(41) *Electrotechnische Zeitschrift*, Berlin, Germany.
(42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, $1.
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(45) *Colliery Engineer*, Scranton, Pa., 25c.
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(47) *Mechanical Engineer*, Manchester, England, 3d.
(48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m.
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(50) *Stahl und Eisen*, Düsseldorf, Germany.
(51) *Deutsche Bauzeitung*, Berlin, Germany.
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(53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h.
(54) *Transactions*, Am. Soc. C. E., New York City, $12.
(55) *Transactions*, Am. Soc. M. E., New York City, $10.
(56) *Transactions*, Am. Inst. Min. Engrs., New York City, $6.

(57) *Colliery Guardian*, London, England, 5d.
(58) *Proceedings*, Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
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(88) *Bulletin* of the International Ry. Congress Assoc., Brussels, Belgium.
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(91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
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(100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
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(102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
(103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
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(109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
(110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.
(111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.

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Ist für einen Fabrikbetrieb der Anschluss an ein Elektrizitätswerk oder eine eigene Kraftanlage vorzuziehen.* Walter Strauss. (44) Serial beginning May 21.

Oerlikon-Doppelanker-Motor mit Kurzschlussanker und 12 Geschwindigkeiten.* A. Boedtker. (107) May 22.

Untersuchungen an der Hilfsmaschine.* H. Lux. (44) May 28.

Ueberspannungsschutz in Theorie und Praxis, eine Diskussion. (44) May 28.

Eine neue Schutzanordnung für elektrische Stromkreise gegen Ueberspannungen und ähnliche Störungen.* Reinhold Rudenburg. (44) May 28.

Industrieanlagen von Wanderarbeitern in Nachbarländern.* Karl Willy Wagner. (44) Serial beginning June 4.

Schaltungsanordnung zur Verwendung der Zeiten betreffenden Oberwellen bei Wechselstromdrehmomenten. H. Lahr. Jeeren. (44) June 4.

Ueber Prüfgeschäft grosser Reichswerk. Insbesondere das Kabel "Berlin-Rheinland."* P. Breslig. (44) June 4.

Ueber das Parallelarbeiten von Drehstrom-Dynamos. Franklin Punga. (44) June 11.

Erfahrungen bei der Fabrikation und Verlegung des Prüfkabels auf der Strecke Berlin-Magdeburg. A. Rhelius. (44) Serial beginning June 18.

Kühlwandungsüberspannungen.* W. Petersen. (44) June 18.

Der Ausdau-Detektor und-Verstärker.* Lee de Forest. (44) June 18.

*Illustrated.

Electrical—(Continued).

Verfahren zum Regeln von Mehrphasen-Reihenschlussmotoren mit Doppelbürsten durch Bürstenverschiebung.* J. Jonas. (41) June 18.
Praktische Fälle von Fehlerortsbestimmungen.* K. Simons. (41) June 18.
Ein neuer Gedanke für den Entwurf und die Herstellung elektrischer Maschinen, sowie einige amerikanische Herstellungs-und Versuchsmethoden.* G. Pontecorvo. (41) June 25.
Schaltvorgänge bei elektrischen Maschinen und Transformatoren.* W. Linke. (41) July 2.
Die Entwicklung der Elektrizitätsversorgung in Grossbritannien. A. H. Seabrook. (41) Serial beginning July 9.
Funkentelegraphie und Luftfahrt.* H. Thurn. (41) Serial beginning July 9.

Marine.

New Coaling Station at Tyne Dock.* (22) May 1; (57) May 8.
Torpedo-Boat for the Spanish Navy.* (11) May 1.
The New Cunarder *Aquitania.** (11) May 8; (12) May 29; (46) June 6.
Making the Navy's New 14-inch Guns.* Louis E. Browne. (46) May 9.
The Control of Marine Turbines from the Navigating Bridge. (12) May 22.
The World's Largest Steamship, the *Vaterland.** (46) May 23.
The Motor Ship *Arum.** (12) May 29.
Geared Cross-Channel Steamer for South America.* (12) May 29.
The Steam Turbine and Reduction Gear, Propelling Machinery for the U. S. N. Collier *Neptune.** (19) Serial beginning May 30.
The Electrically Driven Gyroscope in Marine Work.* H. C. Ford. (42) June.
Electric Heating as Applied to Marine Service.* C. S. McDowell and C. M. Mahood. (42) June.
Westinghouse Marine Equipment.* (64) June 2.
A New Type of Self-Trimming Collier, the *Datetree.** (12) June 5.
The French Destroyers *Bisson* and *Renandin.* (12) June 5.
The Hamburg-Amerika Liner *Imperator.** (11) June 12.
The New Armstrong Naval Shipbuilding Yard.* (11) July 3.
The Wallsend Slipway and Engineering Works.* (11) July 3.
New Cable Steamer *Edouard Jeramec.** (73) July 3.
An Underwater Siren to Prevent Collisions at Sea.* P. Harvey Middleton. (46) July 4.
First Pacific-Built Diesel Ship.* C. A. Osier. (64) July 21.
Tracteurs Automobiles de la Compagnie Générale de Navigation pour le Halage des Bateaux sur les Canaux.* M. Guillet. (43) May.
Calcul de l'Augmentation de Chargement ou de la Vitesse des Navires Obtenue par l'Accroissement de leurs Dimensions. (33) May 2.
Le Nouveau Paquebot *Aquitania* de la Compagnie Cunard.* M. Hachebet. (33) June 13.
Die Transformatoranlage des Seebäderdampfers *Königen Luise* der Hamburg-Amerika-Linie.* W. Spannhake. (48) Serial beginning Mar. 28.
Schiffsölmaschinen der Niederländischen Marine.* P. Meyer. (48) Serial beginning Apr. 4.
Zwischengetriebe auf Schiffen.* W. Kaemmerer. (48) Apr. 11.
Neue Schiffsantriebe.* W. Kaemmerer. (48) May 2.
Die neue amerikanische Dampfjacht *Cyprus.** C. Kluge. (48) May 9.
Neuere Versuche für Schiffsschleusen.* H. Krey. (40) Serial beginning June 6.

Mechanical.

Modern Flour-Mill Machinery.* Robert B. Creak. (75) Oct. 1913.
Cutting Power of Lathe Turning Tools.* William Ripper and G. W. Burley. (75) Oct., 1913.
Test of Steam Regenerators and Low Pressure Turbines.* Frank E. Leahy. (98) Feb.
Notes on Specifications for Regenerators.* O. P. Hood. (98) Feb.
Experiments with a Small Steam Regenerator.* C. L. W. Trinks. (98) Feb.
Milling Machine Practice. A. J. Baker. (61) Feb. 17.
Somerville's Process for the Estimation of Sulphur in Spent Oxide by Combustion.* C. Winthrope Somerville. (Abstract from Report.) (66) Apr. 28.
High Pressure Gas Lighting and the New Silica Lamp. George Keith. (Paper read before the London and Southern Dist. Junior Gas Assoc.) (66) Apr. 28; (24) July 13.
Gas Development in a Mining Area.* Arnold W. Branson. (Paper read before the British Commercial Gas Assoc.) (66) Apr. 28.
Manufacture of Small Steel Castings. C. S. Koch. (Paper read before the Pittsburgh Foundry Assoc.) (47) May 1.
The Heat Analysis of an Oil-Fired Water-Tube Boiler.* Donald W. Rennie. (12) Serial beginning May 1.
The Bamberton Cement Works.* (26) May 1.

*Illustrated.

Mechanical—(Continued).

A Problem of Modern Gas Practice.* J. W. Cobb. (Paper read before the North of England Gas Managers Assoc.) (66) May 5.
Gas Light and Coke Company's Bill and Testings for Calorific Value. (66) May 5.
Largest Coal Handling Plant in the World, Norfolk, Va.* (20) May 7.
Features and Methods of an Immense Tractor Plant.* Ethan Viall. (72) May 7.
Belt Coal Conveyors.* (23) May 8.
Clo Ansaldo & Co. (History and Works of This Firm.) (12) May 8.
Inexpensive Motoring. A. Ludlow Clayden. (29) May 8.
Unmarketable Coal Used for Generating Electricity.* (27) Serial beginning May 9.
Artificial Production of Coal. (From *Journal* of the Society of Chemical Industry.) (24) May 11.
Making Branch Connections Under Pressure in Osaka.* K. Shimomura. (66) May 12.
Recovery of Coke and Bye-Products from Peat. F. Mollwo Perkin. (Paper read before the Soc. of Chemical Industry.) (66) May 12.
Mechanical Engineering in Gas Works. J. Edmondson. (Paper read before the Manchester and District Junior Gas Assoc.) (66) May 12.
Gas Passage in Return-Tubular Boilers.* Osborn Monnett. (64) May 12.
Progress of the Smoke Abatement Movement in Europe. John C. Kershaw. (64) May 12.
Transmission of Power by Manila Rope.* Reginald Trautschold. (64) May 12.
The Sherardizing Process Illustrated.* (20) May 14.
Steam Power Station of the Lehigh Navigation Electric Co.; Generation of Energy from Low-Grade Fuels. (13) May 14.
A Modern Steel Construction Shop. Plant of Riter-Conley Co.* (20) May 14.
The Safeguarding of Grinding Machines.* (Report of a Committee of the National Machine Tool Builders' Assoc.) (20) May 14.
Worm and Worm Wheel Drives.* E. J. Lees. (Paper read before the Cleveland Eng. Soc.) (47) May 15.
Ice Houses and Their Equipment for Car Icing.* L. J. Putnam. (15) May 15.
The Bonecourt Surface Combustion Process.* (12) May 15.
New Boilers and Coal-Handling Plant at Southend.* (12) May 15.
The Transmission of Power by Ropes. Edwin Kenyon. (Paper read before the Textile Inst.) (57) May 15.
A Central Exhaust Steam Engine.* (12) May 15.
Equitable Gas Rates. S. E. De Frese. (Paper read before the Southern Gas Assoc.) (83) May 15; (24) June 8.
Welding and Cutting of Metals in the Gas Industry. H. P. Harding. (Paper read before the Illinois Gas Assoc.) (24) May 18.
The Distribution of Heat in the Operation of Steam Boilers. Perry Barker. (Paper read before the Am. Inst. of Chemical Engrs.) (24) May 18.
The Moore Bye-Product Recovery Gas-Producer.* (66) May 19.
Chemistry of Coal Carbonization. John Harger. (Paper read before the Soc. of Chemical Industry.) (66) May 19; (22) May 22.
A Comparison of Boiler Standards. J. W. F. Macdonald. (64) May 19.
Refractory Brick; Their Manufacture, Properties and Definition.* T. E. Montgomery. (76) May 19.
Separation of the Gaseous Paraffins by Fractional Distillation at Low Temperatures.* George A. Burrell and Frank M. Seibert. (Abstract of paper read before the Am. Chemical Soc.) (57) May 22.
The Storage of Coal: Its Feasibility and Advantages.* C. C. Hall. (Abstract of paper read before the Inter. Ry. Fuel Assoc.) (62) May 25; (15) May 22; (25) June.
Carbonizing Plant at the Rochdale Road Gas-Works of the Manchester Corporation.* J. G. New-Bigging. (Paper read before the Manchester District Institution of Gas Engrs.) (66) May 26.
The Application of Stoking Machinery in Small Gas-Works.* W. M. Carr. (Paper read before the Manchester District Institution of Gas Engrs.) (66) May 26; (24) June 29.
High-Pressure Gas Supply and Reinforcement and Low-Pressure Standardization.* B. F. Botwood. (Paper read before the Midland Junior Gas Assoc.) (66) May 26.
Torsion Tests of Cast-Iron.* J. B. Kommers. (72) May 28.
The Reclaiming of Waste Foundry Sand.* (20) May 28.
Heat Treatment in the Steel Wire Industry.* John F. Tinsley. (Paper read before the Am. Iron and Steel Inst.) (20) May 28.
The Development of the Aeroplane.* R. T. Glazebrook. (Paper read before the Aeronautical Soc. of Great Britain.) (11) Serial beginning May 29; (19) Serial beginining June 6.
The Principle of the Bicycle Applied to the Motor Car; a Two-Wheeled Automobile Stabilized by Means of a Gyroscope.* (46) May 30.
Rectangular Coke-Oven Plant.* W. N. Judd. (45) June.

*Illustrated.

Mechanical—(Continued).

Mechanical—(Continued).

Uniform Methods of Computing Fuel Consumption. C. F. Ludington. (Paper read before the Ry. Fuel Assoc.) (25) June.
The Bonecourt Boiler.* C. D. McCourt. (77) June.
The Construction of a Wireless Station. C. G. Roach. (77) June.
A Study of the Annealing Process for Malleable Castings.* Oliver W. Storey. (105) June.
German Motor Trucks and Trailers.* (60) June.
The Present Status of Air-Ships in Europe.* Jerome C. Hunsaker. (3) June.
The Welding of Metals with Liquid Fuel.* W. N. Best. (55) June.
The Oxy-Acetylene Process of Welding.* Henry Cave. (55) June.
The Thermit Process of Welding.* W. R. Hulbert. (55) June.
Tests of Four-Pass Boilers with Illinois Coal.* Bryant Bannister. (55) June.
Large Steam Power Plants. (Topical Discussion, Am. Soc. of Mech. Engrs.) (55) June.
Present Status of Prime Movers.* H. G. Stott, R. J. S. Pigott and W. S. Gorsuch. (42) June.
The Industrial Position of Artificial Gas. John W. Lansley. (Paper read before the Southern Gas Assoc.) (24) June 1.
Some Points of Interest in High-Pressure Gas Submarine Pipes. C. R. Phenecie. (Paper read before the Wisconsin Gas Assoc.) (24) June 1.
Products of the Carbonization of Coal. C. Earl Little. (83) June 1.
Some Notes on Wet Purification (Gas-Works).* Ernest Hornsby Clarry. (Paper read before the Institution of Gas Engrs. and Managers.) (66) June 2.
The Largest Steam Turbines and Surface Condensers; New Station of the Philadelphia Electric Co.* (13) June 4.
76-Ton Steam Shovel.* (11) June 5.
The Design of Rolling-Mills for Cold Metal.* (11) June 5.
Recording Pyrometers.* C. R. Darling. (Abstract of paper read before the Faraday Soc.) (73) June 5.
Design of Surface-Condensing Plant.* W. Vincent Treeby. (Paper read before the Institution of Engrs.) (47) June 5.
Cement Company Recovers Kiln Dust to Prevent Damage to Orange Crops; Patented System of Gravity Separation and Washing at California Mill.* T. J. Fleming. (14) June 6.
Insulation for Cold Storage. Henry Payne. (Abstract of paper read before the Vic. Inst. of Engrs.) (19) June 6.
English Radiant-Fuel Heating Stoves.* F. W. Goodenough. (24) June 8.
Economical Auxiliaries in a Refrigerating Plant.* K. M. Gilbert. (64) June 9.
Burning Fuel Oil Under Boilers. W. G. Greenlees. (64) June 9.
Gas Measuring and Recording Apparatus.* (66) June 9.
Coal Gas and Petrol Gas: A Comparison. E. Scott-Snell. (66) June 9.
Alteration to a Conveyor Drive.* H. C. Widlake. (66) June 9.
The Motor Bus and Municipal Problems Pertaining to its Operation. John A. McCollum. (Abstract of paper read before the Natl. Conference on City Planning.) (13) June 11.
Late Developments in By-Product Coke Ovens.* William H. Blauvelt. (Paper read before the Am. Iron and Steel Inst.) (20) June 11; (47) July 10; (22) June 12; (24) June 22.
Notes on the Factory Lighting Laws in the United States.* Clarence E. Clewell. (72) June 11.
Laundry Machinery.* (11) Serial beginning June 12.
Chambers Epicyclic Motor-Car Gear.* (11) June 12.
Standards for Gas Service. E. B. Rosa and R. S. McBride. (From *Circular*, U. S. Bureau of Standards.) (24) June 15.
Partial and Intermittent Combustion of Gas.* E. E. Somermeier. (From *Journal of Industrial and Eng. Chemistry.*) (24) June 15.
Preparation and Utilisation of Tar (at Small Gas Works).* Alfred Hansen. (Paper read before the Iowa District Gas Assoc.) (83) June 15; (24) June 8.
Variations in the Quality of Natural Gas. George A. Burrell and Frank M. Seibert. (Paper read before the Natural Gas Assoc.) (83) June 15.
Loss of Natural Gas in Transportation. Alfred J. Diescher. (Paper read before the Natural Gas Assoc.) (83) June 15.
Description of the Works of the Liverpool Gas Company.* Edward Allen. (Paper read before the Institution of Gas Engrs.) (66) June 16.
The Dryco System of Coke Cooling.* (66) June 16.
Telpherage Coke-Conveying Plant at Liverpool.* (66) June 16.
A Critical Review of Flameless Incandescent Surface Combustion. H. H. Gray. (66) June 16.
Glover-West Vertical Retorts at Tipton.* (66) June 16.
Firing and Burning in the Manufacture of Clay and Rock Products.* Ernst Schmatolla. (76) Serial beginning June 16.
A Simple Volume Regulator for Air Compressors.* (13) June 18.
Powdered Coal as Fuel.* E. A. Snverkrop. (72) June 18.
Drop-Forging Die Design.* Walter G. Groocock. (72) June 18.

*Illustrated.

Mechanical (Continued)

Uniform Methods of Computing Fuel Consumption. C. T. Ledingham. (Paper read before the Ry. Fuel Assoc.) (5). June.

The Bluecrest Boiler.* C. H. Merchant. (27). June.

The Conversion of a Wireless Station. G. G. Roach. (27). June.

A Study of the Admitting Process for Reciprocating Engines.* Oliver W. Storey. (103). June.

German Motor Trucks and Trailers.* (60). June.

The Present Style of Air-Ships in Europe.* Jerome E. Thompeler. (4). June.

The Welding of Metals with Liquid Fuel.* W. N. Bell. (35). June.

The Oxy-Acetylene Process of Welding.* Harry Dare. (35). June.

The Thermit Process of Welding.* W. R. Hulbert. (35). June.

Tests of Four-Pass Boilers with Illinois Coal.* Bryan Donkin. (35). June.

Large Steam Power Plants. (Topical Discussion, Am. Soc. of Mech. Engr.) (35). June.

Present Status of Prime Movers.* H. C. Sadler, E. J. S. Pigott and W. S. Gorsuch. (42). June.

The Industrial Position of Artificial Gas. John W. Lawler. (Paper read before the Southern Gas Assoc.) (24). June 1.

Some Points of Interest in High-Pressure Gas Submarine Pipes. C. R. Pocock. (Paper read before the Wisconsin Gas Assoc.) (24). June 1.

Products of the Carbonization of Coal. C. Earl Little. (33). June 1.

Some Notes on Wet Purification (Gas-Works).* Norman Thornby Clarry. (Paper read before the Institution of Gas Engrs. and Managers.) (60). June 2.

The Largest Steam Turbines and Surface Condensers: New Station of the Philadelphia Electric Co.* (13). June 4.

The Steam Shovel.* (11). June 5.

The Design of Rolling-Mills for Cold Metal.* (11). June 5.

Recording Pressmeters.* C. H. Darling. (Abstract of paper read before the Farmer Sec.) (33). June 5.

Design of Surface-Condensing Plant.* W. Vincent Tuesby. (Paper read before the Institution of Engrs.) (42). June 5.

Common Carbonic Recovery Kiln Plant to Prevent Damage to Orange Crops: Patented Invention for Cold Storage. Percy Pryce. (Abstract of paper read before the Vic. Inst. of Engrs.) (19). June 6.

English Radiant-Fuel Heating Stoves.* E. W. Goodenough. (24). June 8.

Economical Analysis in a Refrigerating Plant.* R. M. Gilbert. (64). June 9.

Burning Fuel Oil Under Boilers. W. C. Dreyfus. (64). June 9.

Gas Measuring and Recording Apparatus.* (60). June 9.

Coal Gas and Petrol Gas: A Comparison. E. Scott-Snell. (60). June 8.

Alteration to a Conveyor Drive.* H. C. Whitaker. (64). June 9.

The Motor Inn and Municipal Problems Pertaining to Its Operation. John A. McCollum. (Abstract of paper read before the Natl. Conference on City Planning.) (13). June 11.

Late Developments in By-Product Coke Ovens.* William H. Blauvelt. (Paper read before the Am. Iron and Steel Inst.) (20) June 11; (47) July 19. (22) June 12; (24) June 22.

Rules on the Factory Lighting Laws in the United States.* Clarence R. Clewell. (72). June 12.

Laundry Machinery.* (11). Serial beginning June 12.

Centrifugal Machine-Gas Dust.* (11). June 12.

Standards for Gas Service. M. H. Ross and C. E. Mehrtens. (Penn Central, C. E. Bureau of Research and Standards). (24). June 15.

Petrol and International Combustion of Gas.* H. C. Sweetman. (Trans. Journal of Industrial and Gas, Cambridge.) (24). June 12.

Properties and Utilization of Tar (at Small Gas Works).* Alfred Hanson. (Paper read before the Lowa District Gas Assoc.) (82). June 13. (24) June 8.

Variations in the Quality of Natural Gas. George A. Burrell and Frank M. Seibert. (Paper read before the Natural Gas Assoc.) (82). June 13.

Loss of Natural Gas in Transportation. Alfred J. Boecker. (Paper read before the Natural Gas Assoc.) (82). June 13.

Description of the Works of the Liverpool Gas Company.* Edward Allen. (Paper read before the Institution of Gas Engrs.) (60) June 16.

The Dry-O System of Coke Cooling.* (60). June 16.

Telpherage Coke-Conveying Plant at Liverpool.* (60). June 16.

A Central Service of Pressure Incandescent Surface Combustion. N. R. Gray. (60). June 16.

Glover-West Vertical Retorts at Tilton.* (60). June 16.

Piping and Burning in the Manufacture of Clay and Rock Products.* Ernst Schmatolla. (70). Serial beginning June 16.

A Simple Volume Regulator for Air Compressors.* (13). June 18.

Powdered Coal as Fuel.* E. A. Norrykoop. (72). June 18.

Drop-Forging Die Design.* Walter G. Groocock. (72). June 18.

*Illustrated.

Mechanical—(Continued).

Development of Interchangeable Manufacture.* Joseph W. Roe. (72) June 18.
A New Oil-Engine Air Compressor.* (13) June 18.
Steam Station for Long-Distance Power Transmission.* Frank G. Allen. (13) June 18.
Design and Operation of Modern Boiler-House Plant.* S. E. Fedden. (Abstract of paper read before the Incorporated Municipal Elec. Assoc.) (47) June 19; (73) June 19.
The Müller Condenser.* (12) June 19.
Gas Rate Making. Henry I. Lea. (24) June 22; (83) June 15.
Study of the Composition of Water Gas Tar. C. R. Downes and A. L. Dean. (From the *Journal of Industrial and Eng. Chemistry.*) (24) June 22.
First Buckeye-Mobile in Commercial Service in America.* (64) June 23.
Tests of the Taylor Stoker in Moderate Sizes. Horace Judd. (Paper read before the Ohio Soc. of Mech., Elec. and Steam Engrs.) (64) June 23.
Thermal Phenomena in Carbonization. Harold Hollings. (Paper read before the Institution of Gas Engrs.) (66) June 23; (57) June 26.
Purification by Heat: A Century's Progress and Its Lessons.* Charles C. Carpenter. (Paper read before the Institution of Gas Engrs.) (66) June 23.
Some Special Features in Gas-Works Practice from Norway.* B. Schieldrop. (Paper read before the Institution of Gas Engrs.) (66) June 23.
Calorific Power as a Standard. Jacques Abady. (Paper read before the Institution of Gas Engrs.) (66) June 23.
The Application of Coke-Oven Carbonizing and "Otto" Direct Ammonia Recovery to Gas-Works Requirements.* George Thomson Purves. (Paper read before the Institution of Gas Engrs.) (66) June 23; (57) June 26; (22) June 26.
Pulverizing Coal at Midvale Steel Works.* (20) June 25.
The Conradson Multiple-Spindle Automatic. (72) June 25.
Annealed Castings for Textile Machine Spindles. Robert Buchanan. (Paper read before the British Foundrymen's Assoc.) (47) June 26.
The Wanamaker Transatlantic Flier.* (46) June 27.
A Motor-Driven Raw-Water Ice Factory in Brooklyn.* E. A. Leslie. (27) June 27.
Modern Coal Gas Practice. W. E. Hartman. (Paper read before the Illinois Gas Assoc.) (24) June 29.
Thermal Reactions in Carbureting Water Gas. M. C. Whitaker and W. F. Rittman. (Abstract from *Journal of Industrial and Eng. Chemistry.*) (24) Serial beginning June 29.
Reconstruction of the Widnes Gas-Works.* (66) June 30.
Walschaert Valve Gear Design and Adjustment.* Lewis D. Freeman. (108) July.
Movable River Tipple.* (45) July.
Coal Loading Methods.* J. F. Springer. (45) July.
Cutting Lubricant and Its Application to Turning and Boring Tools.* Albert A. Dowd. (9) July.
Conveyors of the Selective Type.* W. O. Hildreth. (55) July.
Pneumatic Conveyors.* F. B. Williams. (55) July.
Machinery for Handling Small Packages.* S. L. Haines. (55) July.
Chemical and Industrial Applications of Mechanical Refrigeration.* H. J. Macintire. (105) July.
Stone Crushing and Screening Plant, Fairmont, Ill. (67) July.
Flues for Gas Appliances.* R. P. Perkins. (83) Serial beginning July 1.
A New Automatic Manufacturing Lathe.* (72) July 2.
Air Compressors for Foundry Use. B. L. Spain. (From *General Electric Review.*) (47) July 3.
The Lyngström Turbine.* J. Morrow. (73) July 3.
Staley Power Plant in Decatur.* Thomas Wilson. (64) July 7.
Stresses in Convex Heads.* F. G. Gasche. (64) July 7.
The N. & G. Taylor Tin-Plate Works.* (20) July 9.
An Efficiency Testing Machine for Drills, Taps and Dies.* T. T. Olsen. (Paper read before the Am. Soc. for Testing Materials.) (72) July 9.
Burners for Liquid Fuel.* (47) July 10.
Progress in Steam Turbine Design. Francis Hodgkinson. (Abstract of paper read before the Am. Iron and Steel Inst.) (47) July 10.
Mechanical Charging Cars for Coke Ovens.* A. Thau. (57) Serial beginning July 10.
Beehive *versus* By-Product Coke. H. A. Brassert. (Paper read before the Am. Iron and Steel Inst.) (22) July 10.
Cost of Hauling in Chicago, Comparison of Results Obtained by Horses and by Motor Trucks. (14) July 11.
Modern Coal and Ash Handling System, Installation Adopted at the Gorge Power Station, near Akron, Ohio.* Jay C. Lathrop. (14) July 11.
Monterey Gas Decision, Case No. 499, California R. R. Comm. (111) July 11.
The Martinsyde Transatlantic Challenger Monoplane.* H. Bannerman-Phillips. (46) July 11.

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Mechanical.—(Continued).

Development of Interchangeable Manufacture.* Joseph W. Roe. (72) June 18.
A Low Volume Air Compressor.* (11) June 18.
Steam Station for Long-Distance Power Transmission.* Frank O. Allen. (11) June 18.
Design and Operation of Modern Boiler-House Plant.* S. E. Tedds. (Abstract of paper read before the Incorporated Municipal Elec. Assoc.) (47) June 19; (72) June 19.
The Muller Condenser.* (12) June 19.
The Rate Making Theory in Law. (24) June 22; (83) June 25.
Study of the Composition of Water Gas. C. R. Downes and A. L. Dean. (From the Journal of Industrial and Eng. Chemistry.) (24) June 22.
First Moderne-Mobile in Commercial Service in America.* (64) June 22.
Tests of the Taylor Stoker in Montreal Plant. Lorne Judd. (Paper read before the Ohio Soc. of Mech. Elec. and Steam Engrs.) (64) June 22.
Thermal Phenomena in Carbonization. Harold Hollings. (Paper read before the Institution of Gas Engrs.) (66) June 22; (57) June 26.
Purification by Iron Oxide. Properties and Its Lessons.* Charles C. Carpenter. (Paper read before the Institution of Gas Engrs.) (66) June 22.
Some Special Features in Gas-Works Practice from Norway.* H. Scholefield. (Paper read before the Institution of Gas Engrs.) (66) June 22.
Electric Power as a Standard. Jacques Abady. (Paper read before the Institution of Gas Engrs.) (66) June 22.
The Application of Coke-Oven Carbonizing and "OHO" Direct Ammonia Recovery to Gas-Works Requirements.* George Thomson Porter. (Paper read before the Institution of Gas Engrs.) (66) June 22; (57) June 26; (22) June 27.
Pulverizing Coal at Midvale Steel Works.* (20) June 22.
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Annealed Castings for Textile Machine Spindles. Robert Buchanan. (Paper read before the British Foundrymen's Assoc.) (47) June 25.
The Wanamaker Transatlantic Pilot.* (40) June 27.
A Motor-Driven Raw-Water Jet Pump in Brooklyn.* E. A. Leslie. (27) June 27.
Modern Coal Gas Practice. W. H. Harrison. (Paper read before the Illinois Gas Assoc.) (24) June 29.
Thermal Examinations in Carbureting Water Gas. M. C. Whitaker and W. P. Hittinger. (Abstract from Journal of Industrial and Eng. Chemistry.) (24) Serial beginning June 29.
Reconstruction of the Wilkes Gas-Works.* (66) June 30.
Water-Heater Valve Gear Design and Adjustment.* Lewis D. Freeman. (108) July.
Moravia River Tipple.* (45) July.
Coal Loading Methods.* J. P. Gaynor. (45) July.
Cutting Lubricant and Its Application to Turning and Boring Tools.* Albert A. Stoud. (9) July.
Conveyors of the Skelton Type.* W. O. Hibbard. (25) July.
Pneumatic Conveyors.* F. H. Williams. (55) July.
Machinery for Handling Small Packages.* R. L. Haines. (55) July.
Chemical and Industrial Applications of Mechanical Refrigeration.* H. J. Macintire. (105) July.
Stone Crushing and Screening Plant, Belmont, Ill. (67) July.
Fires for Gas Appliances.* R. M. Perkins. (83) Serial beginning July 2.
A New Automatic Metallographic Lathe.* (72) July 2.
Air Compressors for Foundry Use. B. L. Spain. (From General Electric Review.) (47) July 3.
The Lymngton Turbine.* J. Morrow. (73) July 3.
Steam Power Plant in Decatur.* Thomas Wilson. (64) July 7.
Stresses in Convex Heads.* F. O. Ommen. (64) July 7.
The N. & G. Taylor Tin-Plate Works.* (20) July 9.
An Efficiency Testing Machine for Drills, Taps and Dies.* T. T. Olsen. (Paper read before the Am. Soc. for Testing Materials.) (72) July 9.
Burners for Liquid Fuel.* (47) July 10.
Progress in Steam Turbine Design. Frank Hedley. (Abstract of paper read before the Am. Iron and Steel Inst.) (47) July 10.
Mechanical Charging Cars for Coke Ovens.* A. Thau. (57) Serial beginning July 10.
Heating versus By-Product Coke. H. A. Brassert. (Paper read before the Am. Iron and Steel Inst.) (22) July 10.
Cost of Hauling in Chicago. Comparison of Results Obtained by Horses and by Motor Trucks. (14) July 11.
Modern Coal and Ash Hoisting System. Installation Adopted at the Gorge Power Station, near Akron, Ohio.* July 11.
Monterey Gas Decision, Case No. 439, California R. R. Comm. (111) July 11.
The Manufacture of Transatlantic Challenger Mooplane.* H. Hanneman-Phillips. (46) July 11.

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Mechanical—(Continued).

A Crude Oil Gas Producer.* Nisbet Latta. (24) July 13.
Tar-Formation Temperatures for American Coals. (13) July 16.
Glass Furnaces at Morgantown, West Virginia.* R. B. Brinsmade. (82) July 18.
The Paul Schmitt Biplane.* John Jay Ide. (46) July 18.
Caterpillar Engines for Hauling Heavy Machinery.* Lewis H. Eddy. (16) July 18.
Gas Purification by Heat. Charles Carpenter. (24) July 20.
Return-Tubular Boiler Furnace Development.* Osborn Monnett. (64) July 21.
Producer Gas for Industrial and Power Purposes.* Thomas Wilson. (64) July 21.
Boiler Feed-Water Expurgator.* (64) July 21.
Operating Underfeed Stokers. J. C. Hawkins. (64) July 21.
Theory and Practice of Sherardizing. Samuel Trood. (20) Serial beginning July 23.
Machines and Methods in British Engine Work.* Fred H. Colvin. (72) July 23.
Automatic Operations in Manufacturing Motorcycles.* Robert Mawson. (72) July 23.
Manufacturing Hindley Worms. John Lund. (72) July 23.
Some Application of the Oxyacetylene Process.* F. G. Coburn. (72) July 23.
L'Homogénéité des Equations de la Mécanique. A. Merten. (31) Pt. 1.
Etude Théorique des Machines à Air Liquide.* H. Brot. (32) Mar.
La Navigation Aérienne Nocturne.* R. Chassériaud. (32) Mar.
Système de Bandes et Plaques Elastiques Antivibrantes de M. Jolivet. A. Moreau. (92) Apr.
La Fabrication Moderne du Ciment Portland Artificiel.* M. Davidsen. (92) Apr.
Installation de Transport et d'Embarquement du Minerai de Fer des Mines de Rouina (Algérie).* (33) Apr. 25.
La Courroie Liquide Appareil Réducteur Hydraulique à Renversement de Marche et Vitesse Variable.* Maurice Tourreil. (37) Apr. 30.
Le Vol à Voile Ondulé.* L. Thouveny. (37) Apr. 30.
Considérations Générales sur les Pompes à Air des Condenseurs.* A. Delas. (32) May.
Etude sur la Constitution d'un Réseau Départemental d'Autobus. M. Marcorelles. (43) May.
Frein hydraulique pour Essais de Moteurs, Système Froude. (34) May.
Turbo-Souffiante de la Société des Forges et Acières de Huta-Bankowa à Dombrowa: Description de l'Installation et Essais de Réception.* Henri Besson. (32) May.
Transformation finale des Méthodes par Voie Humide en Méthodes par Voie Sèche (Cement manufacture). (84) May.
La Force Motrice dans les Fabriques de Ciment. (84) May.
La Combustion par Incandescence et sans Flamme Appliquée au Chauffage des Chaudières.* Ch. Dantin. (33) May 2.
Presse à Forger Hydraulique de 10 000 Tonnes.* (33) May 9.
L'Eclairage Public au Gaz et à l'Electricité à Paris. G. Coupan. (33) May 16.
Les Hangars à Ballons Dirigeables en Allemagne.* (33) May 23.
L'Etat Actuel de l'Estampage en Angleterre et sur le Continent européen.* (33) May 23.
Emploi de la Machine à Forger pour la Fabrication des Ferrures de Voitures et Wagons.* Haguenauer et Les Sœurs. (38) June.
Distribution de Gaz d'Eclairage à Grande Distance, Système Heidelberg.* (34) June.
Groupe Moto-Pompe Fonctionnant au Pétrole, Construit par la Société Aster et L. Berger.* (34) June.
La Protection des Presses à Découper, Emboutir et Estamper les Métaux.* Henri Mamy. (33) June 6.
Théorie et Construction des Engrenages Elliptiques. P. Massot. (37) June 30.
Etude Analytique de Principaux Systèmes de Fours à Coke, à Régénération, leur Stabilité, leur Economie d'Exploitation.* Charles Berthelot. (93) July.
Les Transporteurs Pneumatiques.* Norbert Lallié. (34) July.
L'Automobile Gyroscope Schilowsky.* J. Pettré. (33) July 4.
Turmkrane für Bauausführungen.* W. Dalheim. (48) Apr. 11.
Hohe Speisewasservorwärmung auf Dampfern.* Ofterdinger. (48) Apr. 18.
Künstliche Schleifsteine.* (80) Apr. 18.
Neue Stoss- und Hobelmaschinen. O. Pollok. (48) Serial beginning Apr. 25.
Die Schaufelung von Francisturbinen.* K. Körner. (48) Apr. 25.
Die Giessereianlage der Firma J. M. Voith in Heidenheim a. d. Brenz.* Engelbert Leber. (50) Serial beginning Apr. 30.
Kesselreinigung durch Standstrahl.* Pontani. (102) May 1.
Ueber den Hinterschiff von Spiralbohrern.* Richard Sommerfeld. (48) May 2.
Untersuchungen an Strahlapparaten.* H. Pfotenhauer. (7) Serial beginning May 2.
Ueber die Schwingungen von Dampfturbinen-Laufrädern. A. Stodola. (107) Serial beginning May 2.

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Der kritische Aussendruck zylindricher Rohre.* R. v. Mises. (48) May 9.
Neuere Gleichstrom-Dampfmaschinen.* Fr. Freytag. (48) May 9.
Die Berechnung von Förderdiagrammen für Motoren mit Reihenschluss-Charakteristik.* Hubert Fritze. (48) Serial beginning May 9.
Untersuchungen zur rechnerischen Bestimmung der Lufteinlassschlitze bei Zweitakt-Verbrennungsmaschinen.* Emil Gutmann. (48) May 16.
Der Kreiselpumpenbau der Maffei-Schwarzkopff-Werke G. m. b. H., Berlin.* Richard Schnabel. (48) May 16.
Die gegenwärtige Entwicklung hochwertiger Kondensationsanlagen.* E. Josse. (41) Serial beginning May 21.
Die Explosion des Laufrades einer Lavalturbine.* F. v. Plato. (48) May 23.
Ein neuzeitiger Winddruckmesser.* Giessen. (48) May 23.
Der Riesen-Drehrohrofen und die Frage seiner Wirtschaftlichkeit. J. H. Schütt. (80) May 23.
Ueber eine Vorrichtung zum Oeffnen und Schliessen der Stichlöcher von Kupolöfen.* Richard Fichtner. (50) May 28.
Experimentelle Untersuchung der Druckwechsel und Stösse im Kurbelgetriebe von Kolbenmaschinen.* Hans Polster. (48) May 30.
Ein einfaches, zeichnerisches Verfahren zur Darstellung verlustfreier Strömung von Gasen und Dämpfen durch Düsen auf Grund des *pv*-Diagrammes.* A. Dahme. (48) May 30.
Die Berechnung der Verbrennung. A. B. Helbig. (80) Serial beginning June 4.
Untersuchungen über die Temperaturverhältnisse im Koksofen.* Oscar Simmersbach. (50) June 4.
Das Talbot-Verfahren im Vergleiche mit andern Herdfrischverfahren.* Friedrich Schuster. (50) Serial beginning June 4.
Das neue Blechwalzwerk der Bremerhütte A. G.* (50) June 18.
Kraftgaserzeugung bei gleichzeitiger Gewinnung von Nebenprodukten.* H. R. Trenkler. (41) June 11.
Das neue Blechwalzwerk der Bremerhütte A. G.* (50) June 18.
Verladeanlage der Westfjord Iron Ore Co.* A. Bleichert und Co. (102) July 1.
Neuerungen im Bau grosser Dieselmotoren.* P. Ostertag. (107) Serial beginning July 4.
Neues Block- und Brammenwalzwerk in Diosgyör.* J. Schmitz. (50) July 9.
Untersuchungen über die Bildung von Ammoniak und Zyanwasserstoff bei der Steinkohlendestillation.* Oskar Simmersbach. (50) Serial beginning July 9.

Metallurgical.

Crucible Steel: Some Interesting Facts. George H. Neilson. (98) Feb.
The Development of Copper Leaching and Electrolytic Precipitation at Chuquicamata, Chile.* E. A. Cappelen Smith. (Paper read before the Am. Electrochemical Soc.) (105) May; (103) May 2.
Milling Operations at the Commonwealth Property.* E. H. Leslie. (103) May 2.
The Preferential Flotation of Zinc Sulphides from Mixed Sulphides by the Horwood Process. E. J. Horwood. (Abstract of paper read before the Australian Inst. of Min. Engrs.) (68) May 2; (82) July 18.
The Use of Electricity in the Steel Hardening Room.* R. H. Cunningham. (96) May 7.
Bessemer, Göransson and Mushet: A Contribution to Technical History.* Ernest F. Lange. (From paper read before the Manchester Literary and Philosophical Soc.) (22) May 8.
Leaching of Copper Tailing.* Rudolf Gahl. (Paper read before the Am. Electrochemical Soc.) (103) May 9; (82) May 30.
Disposal of Residue from Amador County Mills, California.* M. W. Von Bernewitz. (103) May 9.
Two Remodeled Blast Furnace Plants.* (20) May 14.
Another Contribution to the History of the Direct Recovery Process.* D. Bagley. (22) May 15.
Copper Matte Production in the Reverberatory Furnace. Herbert Lang. (103) May 16.
Mining and Milling at the American Zinc Property, Joplin.* E. H. Leslie. (103) May 23.
Economical Sliming by Grinding Pans.* M. G. F. Söhnlein. (103) May 23.
Filtering Slimes in Cyanidation.* Herbert A. Megraw. (16) May 23.
Internal Strains in Cold-Wrought Metals, and Some Troubles Caused Thereby.* E. Heyn. (Paper read before the Inst. of Metals.) (47) Serial beginning May 29.
The Foundry Cupola. E. L. Rhead. (Paper read before the British Foundrymen's Assoc.) (47) May 29.
Chloridizing the Sudbury Copper Nickel Ores. Arthur Howe Carpenter. (16) May 30.
Tropenas Converters *vs.* Electric Furnaces for the Manufacture of Steel Castings. G. Muntz. (105) June.

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Metallurgical—(Continued).

Blast Furnace Stoves. J. E. Johnson, Jr. (105) June.
Three Decades' Advance in American Blast Furnace Construction, Reviewed Before Iron and Steel Institute.* Herman A. Brassert. (Abstract of a paper read before the Am. Iron and Steel Inst.) (62) Serial beginning June 1; (20) June 25.
Progress in the Smelting of Mayari Ore.* Richard V. M'Kay. (Paper read before the Am. Iron and Steel Inst.) (20) June 4.
The Tinfos Electrical Ironworks.* (22) June 5.
The Old Dominion Smelting Works.* Richard H. Vail. (16) June 6.
The Murex Process in a German Works.* James M. Hyde. (103) June 6.
Timber-Butte New Concentrator.* Jesse E. Cohn. (82) June 6.
The Multiple-Deck Concentrator.* A. V. Garred. (82) June 6.
Advances in the Metallurgy of Iron and Steel.* Sir Robert Hadfield. (Paper read before the Faraday Soc.) (22) June 12; (12) June 26.
The Southern Aluminum Co.* Donald M. Liddell. (16) June 13.
The Burt Revolving Pressure Filter.* C. E. Rhodes and A. B. Myers. (16) June 13.
Heat Treatment of Steel Wire.* John F. Tinsley. (Paper read before the Am. Iron and Steel Inst.) (22) June 19.
Precipitation from Cyanide Solutions. Herbert A. Megraw. (16) June 20.
Development of Lead Smelting in Missouri.* H. B. Pulsifer. (82) June 20.
Mill of National Copper Mining Co.* Ernest Gayford. (16) June 27.
New Smelting Works of Arizona Copper Co.* Richard H. Vail. (16) Serial beginning June 27.
Milling and Concentrating Practice at Cobalt. Fraser T. Reid. (Paper read before the Canadian Min. Inst.) (82) June 27.
Flotation Tests at Mt. Morgan. William Motherwell. (103) June 27.
The Construction of the Blast Furnace Stack.* J. E. Johnson, Jr. (105) Serial beginning July.
Three-Metal Bronzes. Allmand M. Blow. (105) July.
The Power Problem in the Electrolytic Deposition of Metals.* H. E. Longwell. (55) July.
Electrolytic Refining of the Precious Metals.* H. Lacroix. (105) July.
Ore Treatment at the Argo Mill.* A. H. Roller and H. T. Curran. (16) July 4.
Zinc Smelting at Bartlesville, Oklahoma.* E. H. Leslie. (103) July 11.
The New Aurora Mill.* (103) July 11.
Retorting Cyanide Precipitate.* G. Howell Clevenger. (16) July 18.
Continuous Decantation at the Porcupine Crown Mines.* Maurice Summerhayes. (103) July 18.
Tube-Mill Practice and the Hardness of Ores.* W. B. Blyth. (103) July 18.
Calumet and Arizona's New Smelting Works at Douglas, Ariz.* Richard H. Vail. (16) July 18.
Turbo-Blowers for Furnaces, an Investigation of Steadiness in Pressure, with an Observation on its Advantages. (20) July 23.
Modern American Blast Furnace Practice.* Edgar S. Cook. (20) July 23.
Les Procédés de Métallisation, le Système Schoop.* Norbert Lallié. (34) May.
Les Réserves en Cementation et la Diffusion dans les Solides. Léon Guillet et Victor Bernard. (92) May.
Traitement des Mattes de Cuivre au Convertisseur Basique à l'Usine de Karabach (Oural, District Kichtyme).* K. D. Kolasnikow. (93) May.
Solidification, Réseaux Cellulaires et Croissance des Grains dans les Métaux. Felix Robin. (93) May.
Relations entre les Variations d'Aimantation et de Résistance Electrique du Fer, de l'Acier et du Nickel aux Températures Elevées.* Kotaro Honda. (93) May.
Recherches Physico-Chimiques sur les Métaux à l'Etat Liquide, Détermination de la Densité à Différentes Températures. Paul Pascal et Jouniaux. (93) May.
Fours pour le Traitement Thermique des Métaux Chauffés au Gaz de Gazogène Enrichi à l'Huile Lourde.* A. Grebel. (33) Serial beginning June 13.
Abmessungen und Leistungen moderner Hochöfen. Oskar Simmersbach. (50) Apr. 30.
Elektrostahl. Guggenheim. (41) May 14.
Untersuchungen über die Reduzierbarkeit von Eisenerzen in strömenden Gasen.* Ludwig Mathesius. (50) May 21.

Military.

Drawing Cartridge Cases.* Douglas T. Hamilton. (From *Machinery.*) (19) May 16.
Shop Methods Used in Lining Large Guns.* Hugh Smith. (72) May 28.
Gun Platform Foundations.* (14) June 13.
Expérience de Construction de Voies Ferrées Militaires en Allemagne. Calmel. (Abstract from *Revue du Génie Militaire.*) (43) Mar.

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Mining.

The Sinking and Equipment of Blairhall Colliery, Fife.* Archibald M. Russell. (Paper read before the Min. Inst. of Scotland.) (106) Vol. 47, Pt. 2.
Mining Economics; Some Notes and a Suggestion. John Gibson. (Paper read before the Min. Inst. of Scotland.) (106) Vol. 47, Pt. 2.
Some Experiences in Reversing the Main Air-Currents in Coal-Mines and Mechanical Structures Involved.* William Clifford. (Paper read before the Manchester Geol. and Min. Soc.) (106) Vol. 47, Pt. 2.
Deepening a Shaft by a Rise Method. Hugh Brocklehurst Pilkington. (Paper read before the Manchester Geol. and Min. Soc.) (106) Vol. 47, Pt. 2.
Description of the Proof of the Western Boundary Fault at Holly Bank Colliery.* N. Forrest. (Paper read before the South Staffordshire and Warwickshire Inst. of Min. Engrs.) (106) Vol. 47, Pt. 2.
The Draeger Self-Rescue Apparatus.* Richard Jacobson. (Paper read before the Midland Inst. of Min., Civ., and Mech. Engrs.) (106) Vol. 47, Pt. 2.
The Maco Half-Hour Type of Portable Breathing Apparatus. Harold C. Jenkins. (Paper read before the Midland Inst. of Min., Civ., and Mech. Engrs.) (106) Vol. 47, Pt. 2.
The Huskisson Emergency Type of Rescue Apparatus.* J. G. Huskisson. (Paper read before the Midland Inst. of Min., Civ., and Mech. Engrs.) (106) Vol. 47, Pt. 2.
The Improved Pneumatogen Type of Rescue Apparatus.* Richard Cremer. (Paper read before the Midland Inst. of Min., Civ., and Mech. Engrs.) (106) Vol. 47, Pt. 2.
The Training of Men for Rescue Brigades at the Berry Hill Station. G. H. Greatbatch. (Paper read before the North Staffordshire Inst. of Min. and Mech. Engrs.) (106) Vol. 47, Pt. 2.
Mine Valuation. J. R. Finlay. (58) Mar.
Mine Duty Controllers. Harrison P. Reed. (42) Apr.
The Scranton Mine Cave Problem.* Eli T. Conner. (2) Apr.
Mine Substations. H. Booker and Will M. Hoen. (42) Apr.
The Development of the Electric Mine Locomotive.* G. M. Eaton. (42) Apr.
Self-Contained Portable Electric Mine Lamps.* H. O. Swoboda. (42) Apr.
The Engineering Opportunities of Our Coal Mining Fields.* Andrews Allen. (4) May.
Mining Laboratories of the University of Illinois.* H. H. Stoek and E. A. Holbrook. (4) May.
Reports on the Senghenydd Explosion.* (57) May 1.
Air-Compressor Plant at Ferndale Collieries.* (22) May 8.
Signalling in Coal Mines.* (51) May 8.
Recent Observations in Butte and Anaconda.* W. R. Ingalls. (16) May 9.
Operation and Skip-Chute Timbering at Butte.* Claude T. Rice. (82) May 9.
Stillwater Coal Mining Co.'s Plant Near Tippecanoe, O.* (62) May 11.
The Action of Acid Mine Water on the Insulation of Electric Conductors. H. H. Clark and L. C. Ilsley. (From *Technical Paper*, U. S. Bureau of Mines.) (22) May 15; (57) May 22.
Two Modern West Yorkshire Collieries.* (57) May 15.
Concreting the Junction Shaft.* Robert H. Dickson. (16) May 16.
Electric Switches for Use in Gaseous Mines.* H. H. Clark and R. W. Crocker. (Abstract from *Bulletin*, U. S. Bureau of Mines.) (22) May 22.
Prevention of Dust in Underground Workings. (82) May 23.
Blasting Gelatine: Some Notes and Theories. W. A. Hargreaves. (From *Journal* of the Society of Chemical Industry.) (19) May 23.
Stockpiling on the Iron Range.* L. P. Kellogg. (16) Serial beginning May 23.
Diamond Drilling at Miami.* Foster S. Naething. (16) May 23.
Economic Effect on Certain Ore Deposits of Changes in Depths.* Thayer Lindsley. (16) May 23.
Underground Central Signal Boxes in German Mines.* O. Dobbelstein. (From *Glückauf.*) (57) May 29.
Mica: Its Occurrence, Production and Uses. Douglas B. Sterrett. (82) May 30.
The Electrical Equipment of Collieries. H. S. Ripley. (77) June.
Stripping in Anthracite Region.* William Z. Price. (45) June.
Robbing Mine Air of Its Danger. William H. and Sim Reynolds. (45) June.
The Issaquah Coal Mine.* George Watkin Evans. (45) June.
The Somerset Mine.* B. P. Manley. (45) June.
Building a Group of Circular Concrete Ore Bins.* M. F. Sayre. (13) June 4.
Gas-Driven Electric Power Plant and Electric-Lamp Installation at Grassmoor Collieries.* (22) June 5.
Cylindrical Ore Chutes of Wood Staves. Andrew Fairweather. (Abstract of paper read before the Australasian Inst. of Min. Engrs.) (16) June 6.
New Swedish Hammer Drills.* Carl A. Bergman. (16) June 6.
Handling Norway Magnetites.* Percy Montclair. (82) June 6.
Bethlehem Steel Company's Tofo Mines.* (20) June 11.
Mica Mining in Canada. Hugh S. de Schmid. (Abstract of paper read before the Canadian Inst. of Min. Engrs.) (68) June 13.

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Large Electric Hoists and Ilgner System.* Geo. E. Edwards. (82) June 13.
Draining of Kerr Lake (to Make Available Ore in Lake Bottom). Arthur A. Cole. (From Report to the Temiskaming and Northern Ontario Ry.) (96) June 18.
The Largest Electrically Operated Gold Dredge.* W. H. Gardner and W. M. Shepard. (Abstract from *General Electric Review.*) (103) June 27.
The Calgary-Alberta Oil Fields, Canada.* W. E. Ellsworth. (82) June 27.
Electricity in American Metal Mining.* L. O. Kellogg. (9) July.
American Coal-Dust Precautions. George S. Rice. (45) July.
Cost of Mine Cars. (45) July.
Anthracite Mine Engineering. George W. Engel. (45) July.
The New Weston Colliery.* William Z. Price. (45) July.
Longwall Mining in Ohio.* Wilbur Greeley Burroughs. (45) July.
The Eccles Mine Explosion.* (45) July.
Underground Locomotive Haulage Costs. A. Baijot. (From *Annales des Mines de Belgique.*) (57) July 3.
Relation of Falls of Roof in Collieries on the Middleburg Coalfield to Weather Changes.* Charles J. Gray. (Paper read before the Chemical, Metal., and Min. Soc. of South Africa.) (57) July 3.
Electrical Winding Plant at the Bowdon Close Colliery.* (57) July 3.
Sectional Buildings for Drilling Camps.* George S. Rollin. (16) July 4.
Methods of Testing Placer Gravels. W. J. Radford. (103) July 4.
Making Dynamite Work Efficiently, Analysis of Action of Blast with Reference to Depth and Spacing of Holes and Amount of Powder for Steam Shovel Work.* Charles E. Anderson. (14) July 4.
Endless Rope Haulage for Inclined Plane at a Slope Mine. A. D. MacFarlane. (Paper read before the West Virginia Coal Min. Inst.) (62) July 6.
Miners' Oil Lamps *v.* Miners' Electric Lamps. E. A. Hailwood. (22) July 10.
Equipment of Mine Machine Shops.* F. A. Stanley. (16) July 11.
The Richards Pulsator Riffle in the Recovery of Gold from Auriferous Gravels.* (82) July 18.
Kimberly Diamonds and De Beers.* Frank Conly. (16) July 18.

Miscellaneous.

Field Methods for Printing from Metal. Hermann E. Osann. (100) May.
The Need for the Better Organization of Economic and Industrial Resources. C. R. Enock. (29) May 1.
Unusual Method of Laying an 8-In. Wrought-Iron Submarine Pipe Line. (Transportation of Oil.)* T. H. Vaughan. (13) May 14.
Working to Millionths: (Difraction Grating).* Donald M. Liddell. (72) May 21.
A Rating Table for Excavation with Pick and Shovel. L. K. Sherman, M. Am. Soc. C. E. (86) May 27.
A Traveling Tamping Machine for Earth Fills.* (13) May 28.
Engineers' Estimates as They Affect the Contractor. P. R. Fletcher. (Paper read before the Illinois Assoc. of Municipal Contractors.) (96) May 28.
The Law of Contracts. A. A. Aegerter. (Paper read before the Engrs.' Club of St. Louis.) (1) June.
Engineering Work at Chicago During 1914. (13) June 11.
Notes on the Flow of Oil in Pipes.* E. I. Dyer. (55) July.
Value of Public-Utility Service as a Basis of Rates. (Abstract of report to Natl. Elec. Light Assoc.) (13) June 18.
Making Dynamite Work Efficiently, Analysis of Action of Blast with Reference to Depth and Spacing of Holes and Amount of Powder for Steam Shovel Work.* Charles E. Anderson. (14) July 4.
Contractors and Sureties. George A. King. (14) July 11.
Etude des Courbes Planes. Henry Meuris. (30) Apr.
La Préparation Mathématique des Ingénieurs dans les Différents Pays; Rapport Général. Paul Stäckel. (32) Apr.
L'Anamorphose et l'Ordre Nomographique.* Rodolphe Soreau. (32) Apr.
Verfahren zur Messung schnell wechselnder Temperaturen.* Alfred Petersen. (48) Apr. 18.
Der italienische Gesetzenwurf zum Schutze des Standes der Ingenieure, Architekten und Landmesser. (53) May 22.

Municipal.

Mechanical Engineering Aspects of Road Construction.* R. E. B. Crompton. (75) Oct.
Bituminous Road Construction. Francis Wood. (60) May.
Laying Wood Pavement in London.* S. R. Church. (60) May.
Government of Cities. Nelson P. Lewis. (60) May.
Road and Trail Construction in Alaska.* F. A. Pope. (100) May.
Granite Block Pavements Recut to Small Size and Relaid.* Charles A. Mullen. (60) May.
A Municipal Ice Plant.* (60) May.

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Municipal—(Continued).

The Commission-Manager Form of Government. Henry M. Waite. (Paper read before the Engrs. Club of St. Louis.) (1) May.

Calcutta: Its Evils and Required Improvements.* E. P. Richards. (104) May 1.

Proposed System of Cost Accounting for the Highway Department of Los Angeles County, Cal. John C. Veenhuyzen. (Report to the Highway Dept.) (86) May 6.

Rate of Wear and Strength of Granite Paving Blocks. (Abstract from Report of the Bureau of Highways, Borough of Manhattan, New York.) (86) May 6.

Specifications for Slag Foundations for Brick Pavements. (13) May 7.

Town Planning in Sheffield.* Charles F. Wike. (Paper read before the Institution of Mun. and County Engrs.) (104) May 8.

Skidding Vehicles and Street Pavements. (104) May 8.

Methods of Handling Snow in Boston, Mass. L. K. Rourke. (Abstract of paper read before the Philadelphia Snow Removal Conference.) (86) May 13.

Organization for and Methods and Costs of Constructing Concrete Roads in Milwaukee County, Wis., in 1913. A. J. Knelling. (86) May 13.

A Method of Determining Time of Performance of Work with Special Application to Grading. G. L. Bennett. (Paper read before the Municipal Engrs. of the City of New York.) (86) May 13.

Road Building Economics. Reginald Trautschold. (96) May 14.

The Highway Situation in Ontario. (From Report of the Public Roads and Highways Comm.) (96) May 14.

Notes on Survey Practice at Storm Lake, Ia., with an Accurate Method of Balancing Earthwork from Profile (for Roads).* H. L. Browne. (86) May 20.

Methods and Cost of Snow Removal in Philadelphia in 1914.* Wm. H. Connell. (Paper read before the Philadelphia Snow Removal Conference.) (86) May 20.

Earth Road Construction. J. D. Robertson. (Paper read before the Alberta Assoc. of Local Improvement Districts and Rural Municipalities.) (96) May 21.

Road Maintenance Systems and Methods. M. O. Eldridge. (Paper read before the Maine State Road Convention.) (96) May 21.

Some Notes on the Municipal Works of Salisbury.* W. J. Goodwin. (Paper read before the Institution of Mun. and County Engrs.) (104) May 22.

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Proportioning Gravel Concrete: Quantity and Cost Curves (for Roads).* T. R. Agg and C. S. Nichols. (From *Bulletin*, Eng. Experiment Station, Iowa State Coll. of Agri. and Mechanic Arts.) (86) May 27.

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Experience with Bituminous Pavements, Charlotte, N. C.* S. H. Lea. (13) May 28.

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Economy in Brick Paved Roads.* Will P. Blair. (Paper read before the First Canadian and Inter. Good Roads Congress.) (76) June 2.

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Pennsylvania Mikado and Pacific Type Locomotives.* (15) July 3; (18) July 4; (25) July.
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The Battle of the Gauges in India. Guilford L. Molesworth. (Paper read before the East India Assoc.) (12) July 3.
Moving a Railroad Station on Flat Cars.* L. W. Duffee. (14) July 4.
A 151-Mile, 1 200-Volt Line in Texas (Interurban Railroad).* (17) July 4.
Dining Cars for the Southern Pacific Co.* (18) July 4.
Mikado Type Locomotives for the Illinois Central R. R.* (18) July 4.
Front End Grate and Ash-Pan Design.* C. M. Hatch. (Paper read before the Inter. Ry. Fuel Assoc.) (18) July 4; (25) June.
Discussion of Depth of Drill Holes Most Advantageous in Driving Tunnel Heading. D. W. Brunton and J. A. Davis. (From *Bulletin*, Bureau of Mines.) (86) July 8.
A Pittsburgh Railway Station.* R. P. Forsberg. (13) July 9.
Track Plans for Stations on Single-Track Railways.* G. P. De Wolf. (13) July 9.
Resurvey of Right-of-Way, Wheeling & Lake Erie R. R.* (13) July 9.
Steam Railway Electrification. J. A. Shaw. (Paper read before the Canadian Elec. Assoc.) (96) July 9.
Fuel Economy in Locomotives. (Abstract of report to Am. Master Mech. Assoc.) (47) July 10.
The New York Central's Improvements at Utica, N. Y.* (15) July 10.
Making Railroad Fill from Pontoon Bridge, Novel Device used in Carrying Canadian Northern Railway Across an Arm of Rainy Lake Three Miles Wide. (14) July 11.

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Union Station at Dallas, Texas.* (13) June 27.

Graphical Rating of Single Locomotives.* C. S. Cryer. (12) June 20.

Observations on Pulsing Temperatures and Properties of Coals. G. R. Burrows and others. (13) June 20.

Some Recent French Locomotive Performances. A. T. Burgh. Discussion. (12) June 20.

Heat Transmission Tests on Steel Rail Car Section.* Arthur C. Willard. (13) June 20.

Economical Trials Locating for a Given Territory.* Albert G. Mott. (13) June 20.

Jersey Central Engine Terminal at Communipaw.* (13) June 20; (14) June 6; (20) July 8.

The Valuation of Railways. Lucas C. Meyfarth. (Paper read before Johns Hopkins Univ.). (13) June 20.

The Turbo Railway.* (1) June 20; (22) July 8.

The Cooling and Development of the Internal Combustion Railway Locomotive. Wm. P. Dunn. (Paper read before the Institution of Locomotive Engrs.) (22) June 20.

Ten-Wheeled Locomotives for the Transcontinental Railway, Australia.* (22) June 20.

Locomotive Power City Passenger Station.* (14) June 27.

Locomotives on the Mission Railway.* (17) June 27.

Tractor Trucks and Additional Locomotives for Duties. Announced in Trade Rly. (18) June 27.

Automatic Block Signals on the Illinois Steel R. R. & I. Co. W. Wood. (27) July.

Tower A Interlocking Plessing N. R.* (27) July.

Reading Junction Roundhouse, A. T. & S. F. Ry.* (27) July.

Track Scales.* (Abstract from Report of the Am. Ry. Bridge and Bldg. Assn.) (27) July.

A Reinforced Concrete Substructure for Wooden Water Tank. R. L. & P. Ry.* A. M. Wolf. (27) July.

Locomotive Tool Equipment.* C. T. Monnal. (25) July.

Rolling Stock on Curves.* Albert R. Trego. (25) July.

Draft Gear Problem—Recurved Resultor (Railway Equipment). E. W. Sewell and others. (25) July.

Hot Water Boiler Washing System (Chesapeake & Ohio R. R.).* E. A. Murray. (25) July.

The Keiloplone System of Signalling.* (2) July.

The Holbrook Superheater. (2) July.

Locomotive Superheaters and Their Performance.* C. D. Young. (1) July.

A Rail-Bending Conveying Trough Car.* (12) July 2.

Tunnel Ventilation During Construction.* E. Lamboll. (20) July 2.

Printing Temperatures in Rolling Rails. (From Report of the Bureau of Standards). (20) July 2.

A Naval Freight Locomotive.* (13) July 2.

A Special Rail Section for Curves. (13) July 2.

The Operation of Large Locomotives Yards. A. M. Dunbar and others. (13) July 2.

Pennsylvania Mikado and Pacific Type Locomotives.* (13) July 3; (20) July 4; (25) July.

The Resistance of Locomotives and Rolling Stock.* T. Robson. (12) July 2.

The Limits of the Gauge in India. Guilford L. Molesworth. (Paper read before the East India Assn.) (12) July 2.

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A Philadelphia Railway Station.* E. P. Potwin. (13) July 8.

Track Plans for Stations on Single-Track Railways.* C. P. De Weil. (13) July 8.

Recovery of High-of-Way Wheeling & Lake Erie R. R.* (13) July 9.

Steam Railway Electrification. J. A. Shaw. (Paper read before the Canadian Elec. Assoc.) (20) July 9.

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Making Railroad Fill from Pontoon Bridge, Novel Device Used in Crossing Canadian Northern Railway Across an Arm of Rainy Lake Three Miles Wide. (14) July 11.

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Roadbed and Terminal Improvements, Baltimore & Ohio R. R.* (18) Serial beginning July 11.
An Electric Monorail Without a Frog.* (62) July 13.
Scoop Car for Handling Railway Slides (Norfolk & Western R. R.).* (13) July 16.
New 120-lb. Rail Section; Pennsylvania R. R.* (13) July 16.
The Creosoting Plant of the Atlantic Coast Line; a Description of the Layout, Equipment and Method of Loading Ties at this Modern Southern Installation.* (15) July 17.
The Magnolia Cut-Off of the Baltimore & Ohio.* (15) July 17.
Practical Considerations in Installing Turnouts. W. F. Rench. (15) July 17.
Results of the Electrification of a Congested Italian Line.* L. Pontecorvo. (15) July 17.
New Steel Cars for the Michigan United Traction.* (17) July 18.
Concrete Railroad Shops at Houston.* (14) July 20.
Mesure de l'Utilité des Chemins de Fer.* Alfred Picard. (43) Mar.
La Ségrégation dans les Rails. Goupil. (43) Mar.
Expérience de Construction de Voies Ferrées Militaires en Allemagne. Calmel. (Abstract from *Revue du Génie Militaire.*) (43) Mar.
L'Eclairage Electrique des Trains par le Système Dick.* Ch. Dantin. (33) Apr. 25.
Note sur l'Organisation et sur le Fonctionnement des Dépots d'Entretien de la Compagnie des Chemins de Fer de l'Est.* M. Duchatel. (38) June.
La Nouvelles Locomotives de la Compagnie P.-L.-M.* (33) June 6.
Les Transformations de la Gare Saint-Lazare, à Paris.* Ch. Dantin. (33) June 27.
La Répétition de Signaux sur les Locomotives.* E. Maynard. (33) July 4.
Der neue Personenbahnhof in Karlsruhe in Baden. Otto Linde. (49) Pt. 4.
Zwei Betonbauten vom Stuttgarter Bahnhof-Umbau; der Doppeltunnel durch den Rosenstein und die viergleisige Eisenbahnbrücke über den Neckar.* Spangenberg. (51) Serial beginning Sup. No. 10.
Vierzylinder-Heissdampf-Güterzuglokomotive der schweizerischen Bundesbahnen, Serie C 5/6.* Max Weiss. (107) Apr. 25.
Die Krankenwagen der österreichischen Staatsbahnen.* G. Garlik, Ritter von Osoppo. (102) Serial beginning May 1.
Der E-Schieber im Lokomotivbau.* F. Werle. (48) May 2.
Ueber die Wahl der Hauptabmessungen von Dampflokomotiven.* E. Lihotzky. (53) Serial beginning May 8.
Schwellenkörper für eine schlackenhunten befahrene Grubenbahn.* H. F. Kühl. (80) May 9.
Trockenlegung von Eisenbahntunneln. Martin. (40) May 9.
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Die Schmelzschweissung in der Eisenbahnwerkstätte Floridsdorf-Jedlesee der österreichischen Nordwestbahn. F. Holey. (102) May 15.
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Versuche an einer Nassdampf-Zwillings-Schnellzuglokomotive.* R. Sanzin. (48) May 30
Italienische Regel- und Schmal-Spur-Nebenbahnen.* G. Pincherle. (102) Serial beginning June 1.
Bogenweiche.* Walloth. (102) June 1.
Bestimmung der Fahrzeiten von Eisenbahnzügen.* L. Terdina. (102) June 1.
Vorrichtungen zum Richten verbogener Stirnwandrahmen offener Güterwagen und zum Biegen und Richten von Schienen, Trägern, Wellen und dergleichen.* G. Rosenfeldt. (102) June 25.
Weichenverbindung zwischen gekrümmten Gleisen.* R. Friedmann. (102) July 1.
Vom Bau der ostafrikanischen Mittellandbahn von Tabora zum Tanganjika-See.* C. Gillman. (107) July 4.
Indikator-Versuche an Lokomotiven. Rudolf Sanzin. (53) Serial beginning July 10.

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City Transportation—Subways and Railroad Terminals.* Bion J. Arnold. (4) Apr.
The Signalling of a Rapid-Transit Railway.* H. G. Brown. (77) May 1.
Express and Freight Service on the Detroit United Lines.* (17) May 9.

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Overhead Problems; Feeders, Feed Taps and Lightning Arresters. Charles Rufus Harte. (17) May 16.
Traffic Development at Quebec.* (17) May 23.
The Twin Peaks Tunnel of San Francisco.* (86) May 27.
The Tri-City Railway's New Carhouse in Rock Island, Ill.* (17) May 30.
Hearing on Public Ownership of Street Railways in Washington. (17) May 30.
Compressed-Air Work Specifications, Comprehensive Requirements Governing Use of Compressed Air in Construction of New York Subway Tunnels under East River. (14) May 30.
Thin Arch Tunnel Subway Roof, Lining of Three-Piece Reinforced-Concrete Bents for Buenos Aires Tube. (14) May 30.
Evolution of Railway Motor Gearing.* W. G. Carey. (From *General Electric Review.*) (108) June.
The New York Municipal Car Design.* (17) June 6.
Approximate Cost of Rapid Transit Structures. John Vipond Davies. (Abstract of paper read before the Natl. Conference on City Planning.) (14) June 6; (13) June 11.
Detroit United Railway's New Machine Shop.* (17) June 13.
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Report of Committee, Am. Elec. Ry. Assoc., on Cost of Passenger Transportation Service. (17) June 20.
Motor Bus Traffic, Its Development and Characteristics. John A. McCollum. (Abstract of paper read before the National Conference on City Planning.) (96) June 25.
Overhead Charges in Valuations. Harry G. Abendroth. (Abstract of paper read before the Milwaukee Elec. Ry. & Light Co.) (17) June 27.
Oxy-Acetylene in an Electric Railway Shop.* (17) June 27.
Construction Difficulties with Stockton St. Tunnel, San Francisco.* (13) July 2.
Timbering in Open Cut for Fourth Ave. Subway, Brooklyn.* (13) July 2.
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A Traffic Study in Manchester, England.* J. M. McElroy. (Abstract of Report to the City of Manchester.) (17) July 4.
Pneumatic Concreting, Stockton Street Tunnel. (14) July 4.
Placing Concrete at 43.5 Cents Per Yard (Pneumatic Process).* (14) July 4.
Who is Responsible for Pavement Deterioration Along Street Car Tracks? P. E. Green. (14) July 4.
One-Story Street Railway Shops at Louisville; Concrete for Floors and Foundations Delivered by 140 Foot Tower.* (14) July 4.
Montreal Tramways Shops at Yonville.* (17) July 11.
Westbahnhof, Praterstern; eine Studie über die Rentabilität dieser Linie aus dem Netze der künftigen Wiener Untergrundbahn.* Emil A. Roth. (53) Apr. 24.
Die Untergrundbahn in Buenos Aires. E. E. Wachsmann. (41) May 7.

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The Pennsylvania Department of Health in Relation to Industrial Welfare. Samuel G. Dixon. (98) May.
The Control of Oriental Plague. E. J. McCaustland. (36) May.
A Sanitary Sewer Layout for the City of Oneonta, N. Y. Frank M. Gurney. (36) May.
Disinfection of Sewage and Its Success in a Small City. Frank A. Nikirk. (60) May.
The Collection and Treatment of Sewage in Their Relation to the City of Philadelphia. George S. Webster. (109) May.
A $250 000 Drainage Project in Adams County, Illinois.* (86) May 6.
Water-Tight Sewer-Pipe Joints in Brooklyn.* E. J. Fort. (13) May 7.
Hypochlorite Mixing Tank for the Providence Sewage Disposal Works.* (13) May 7.
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The Control of Stream Pollution. Paul Hansen. (Paper read before the Illinois Academy of Science.) (104) May 8.
Colloids in Water and Sewage Purification. Milton F. Stein. (14) May 9.
Population Studies and Sewer Gagings at Philadelphia, Pa.* (86) May 13.
A Comparison of Day Labor and Contract Work Based on Experience at Winnipeg, Canada. J. W. Astley. (Abstract from the *Contract Record.*) (86) May 13.

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Track Development at Quebec.* (17) May 23.

The Twin Peaks Tunnel of San Francisco.* (80) May 27.

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Tile Arch Tunnel Subway Roof, Union of Three-Inch Reinforced-Concrete Tile for Plenum Alley Tube. (14) May 30.

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A Trade Study in Manufacture. England.* A. M. Milling. (Abstract of report to the City of Manchester.) (17) July 4.

Pneumatic Concreting Machine Street Tunnel. (14) July 4.

Placing Concrete at 45° Chute for Fourth Ave. Tunnel, Brooklyn.* (14) July 4.

Who is Responsible for Pavement Destruction Along Street Car Tracks? E. E. Green. (14) July 4.

One-Story Street Railway Shops at Lansing: Concrete for Floors and Foundations Relieved by 140 Foot Towers.* (14) July 4.

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Wasserhaltung Problem; eine Studie über die Herstellung dieser Tiefen aus dem Die Untergrundbahn in Buenos Aires. E. H. Wedemann. (41) May 7.

Verso der Londoner Untergrundbahn.* Emil A. Koch. (53) Apr. 24.

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The Control of Cerebral Disease. E. L. McCausland. (36) May.

A Sanitary Sewer Layout for the City of Columbia, S. C. Frank M. Gunby. (36) May.

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Tests of the Electrolysis of Sewage at Toronto.* I. H. Nevitt. (13) May 14.
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Tile-Drain Trench-Digger.* (11) May 22.
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Preliminary Report on Sanitary Policy of Chicago; Experts Recommend Continuation of Sewage Dilution and Immediate Removal of Suspended Matter, with Future Intensive Treatment. (14) May 23; (13) May 14; (96) May 13.
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Earth Slides on the Calumet-Sag Branch of the Chicago Main Drainage Canal.* E. J. Killey and Philip Harrington. (Report to the Trustees of the District.) (86) May 27; (13) May 28.
Experiments on the Oxidation of Sewage at Columbus, Ohio. C. B. Hoover and C. D. McGuire. (13) May 28.
Baltimore's Public Improvements, Guide to City's Engineering Works for Members Attending Convention of American Society of Civil Engineers Next Week.* Calvin W. Hendrick. (14) May 30.
Building a Reinforced-Concrete Outfall Sewer Limited by Tides and Clearances, Work at Vancouver, B. C.* (14) May 30.
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Heating Houses and Buildings by Gas.* (83) June.
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Drainage of Shoshone Irrigation Project, Waterlogging of Soil Reduced by System of Drains.* D. W. Murphy. (14) June 6.
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Street Cleaning and Refuse Disposal in Philadelphia.* William H. Connell. (60) July.
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The Main Drainage and Sewage Disposal Works Proposed for New York City.* (Abstract from Final Report of the Metropolitan Sewerage Comm.) (86) July 1.
Methods used in Investigation of Explosive Gases and Oils in Sewers.* G. J. White. (13) July 2.
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Der Eisenbeton im Weinbau.* M. Schäfer. (78) June 12.
Die neue Blechwalzwerk der Bremerhütte A. G.* (50) June 18.
Wettbewerb zur Erlangung von Entwürfen für ein neues Stadthaus in Solothurn.* (107) Serial beginning June 27.
Entwerfen einfach bewehrter Eisenbetonplatten. Martin Preuss. (78) July 1.
Beitrag zur Konstruktion von Verschiebungsplänen biegungsfester Stabzüge und ihrer Anwendung auf die Berechnung statisch unbestimmter Systeme.* Anton Haupt. (78) July 1.
Der Heimbachsche Verbundpfahl.* H. Nitzsche. (78) July 1.
Mechanische Weberei Walther Münch u. Cie. G. m. b. H. in Schwarzenbach a. W.* Em. Haimovici. (78) July 1.
Das Schneidvermögen der Werkzeugstähle.* Max Kurrein. (50) July 2.

Topographical.

Canada-Alaska Boundary Survey.* J. D. Craig. (14) May 16.
Topographic Survey Cost Data. (13) May 28.
An Australian Method of Setting Slope Stakes.* Sam N. Sutherland. (13) May 28.
Topography of the Bed-Rock under Chicago.* Roderick Peattie. (4) June.
The Substitution of Metal Tapes and Wires for Bars in Base Measurements. William Bowie. (4) June.
Notes of a Hydrographic-Topographic Survey.* J. A. Macdonald. (96) June 4.
Recording the Underground Structures in Los Angeles Streets. (13) June 4.
Computation of Lot Lines on Curved Streets.* F. H. Skinner. (13) June 25.
Military Survey of Oahu.* F. S. Besson. (100) July.

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Topographical—(Continued).

Map Making in Connection with Land Defense for Seacoast Fortifications and Seacoast Cities. Lewis H. Watkins. (100) July.
Some Neglected Points in the Theory and Adjustment of the Wye-Level. J. A. Kitts. (13) July 9.
A Land Survey Problem.* J. A. Macdonald. (96) July 9.

Water Supply.

Water as a Mechanical Agent.* Edward B. Ellington. (75) Oct., 1913.
Water and Life. Lawrence J. Henderson. (28) Mar.
Some Recent Experiences in the Deferrization and Demanganization of Water.* Robert Spurr Weston. (28) Mar.
Proper Charge for Fire Protection Service. (Topical Discussion before New England Water Works Assoc.) (28) Mar.
Use of the Force Pump in Cleaning Service Pipes.* (Topical Discussion before New England Water Works Assoc.) (28) Mar.
Failure of the Stony River Dam.* Theodore E. Seelye. (98) Apr.
New Turbine Pumps of the St. Louis Water Works.* L. A. Day. (Paper read before the Engrs.' Club of St. Louis.) (1) May.
Tank Car Water Supply for Troops on the March. O. N. Sohlberg. (100) May.
The Development of Water Power in Fall Creek. H. B. Pope. (36) May.
300 000 Horse-Power Hydro-Electric Plant on the Mississippi.* (12) Serial beginning May 1.
Contractor's Plant and Methods Employed in Constructing the Tunnel and Shafts of the New St. Louis Water Works Intake at the Chain of Rocks.* C. H. Hollingsworth. (86) May 6; (14) May 9.
Preliminary Work on the Cleveland, Ohio, Water Filtration Project.* M. F. Stein. (86) May 6.
Notes on Fire Protection Requirements of the Water Works in a Town of 4 000 Population. H. B. Long. (Paper read before the Eng. Assoc. of the South.) (86) May 6.
Construction and Cost of the Water Tunnel for the Tallulah Falls Hydroelectric Development in Georgia.* Chas. G. Adsit. (86) May 6.
Organization of Irrigation Operating and Maintenance Force and Its Training. George H. Bliss. (Paper read before the Idaho Soc. of Engrs.) (86) May 6.
Rotary Pump and Hydraulic Variable-Speed Transmission.* (72) May 7.
Water-Filtration and Liquid-Chlorine Plant, Bound Brook, N. J.* Clyde Potts. (13) May 7.
Locating Leaks in Water Mains by Means of the Water-Hammer Diagram.* Melvin L. Enger. (Paper read before the Ill. Water Supply Assoc.) (13) May 7.
Electric Water-Works Pumps Replacing an Old Steam Installation at Baldwinsville, N. Y.* (13) May 7.
Electricity for Pumping. J. M. Bryant. (Abstract of paper read before the Ill. Water Supply Assoc.) (13) May 7.
Rebuilding an Old Wood Penstock.* C. A. Edwards. (14) May 7.
Selection of Pumps for Small Water-Works. W. E. Housman. (13) May 7.
Making Concrete Blocks for Kensico Dam.* Wilson Fitch Smith. (13) May 7.
A Working Erosion Model, to Illustrate the Influence of Vegetation in Checking Erosion.* (19) May 9.
Experiences with Filter Underdrains. J. W. Elims and others. (14) May 9.
High Duty Test of New Triple-Expansion Pumping Engine at Pittsburgh. (14) May 9.
Water Purification Plant at Coffeyville, Two Settling Basins of the Non-Baffled Type Provide Flexibility in Operation.* (14) May 9.
Water Rights an Element of Value in Fixing Rates, U. S. Supreme Court Reverses Lower Court and Sustains Contention of San Joaquin & Kings River Canal & Irrigation Company, Inc. (14) May 9.
Air Displacement Hypochlorite Dosing Apparatus.* Henry W. Taylor. (13) May 9.
Rapid Sand Filtration Plant at Trenton.* (14) May 9.
Improved Water-Sampling Bottle.* Richard H. Eurich. (14) May 9.
Colloids in Water and Sewage Purification. Milton F. Stein. (14) May 9.
Baltimore's New Mechanical Filters.* James W. Armstrong. (14) May 9.
Copper Sulphate Treatment at Philadelphia Waterworks, its Effect in Reducing Micro-organisms in Filtered Water Stored in Open Reservoirs.* Francis D. West. (14) May 9.
Cost of Obtaining Water from Wells at Owensboro, Ky. (86) May 13.
Construction Plant and Methods Employed in Reconcreting the Lining of the Eden Park Reservoir of the Cincinnati Water Works.* Kenneth C. Crain. (86) May 13.
Experts Preliminary Report on Future Water Supply and Sewage Disposal Policy of Chicago. (86) May 13.
Driving the Water Intake Tunnel at St. Louis.* E. C. Davis. (13) May 14.
Greater New York's Water Supply Scheme.* William T. Taylor. (Paper read before the Inst. of Mun. Engrs.) (104) May 15.

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Topographical—(Continued).

Map Making in Connection with Land Defense for Reasons Fortifications and Use.
Some Engineering Points in the Theory and Adjustment of the Wye-Level. J. A. Kitts. (13) July 2.
A Land Survey Problem.* J. A. Macdonald. (90) July 9.

Water Supply.

Water as a Municipal Agent.* Edward M. Gilbert. (75) Oct., 1913.
Water and Life. Lawrence J. Heaverson. (25) Mch.
Some Recent Experiences in the Interpretation and Denaturalization of Water.*
Modern Supply Methods. (28) Mar.
Proper Charge for Fire Protection Service. (Topical Discussion before Fire Dep.
Use of the Pitot Tube in Gauging Service Pipes.* (Topical Discussion before
New England Water Works Assoc.) (28) Mar.
Failure of the Stony River Dam.* Theodore E. Seelye. (69) Apr.
New Turbine Pumps of the St. Louis Water Works.* L. A. Hay. (Paper read
before the Engrs' Club of St. Louis.) (1) May.
Tank Car Water Supply for Troops on the March. C. N. Goldsberry. (100) May
The Development of Water Power in Fall Creek. H. H. Pope. (56) May.
300,000 Horse-Power Hydro-Electric Plant on the Mississippi.* (12) Topical
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of the New St. Louis Water Works Intake.* (Paper read before the Engrs' Club
of St. Louis.) (1) May.
Hollingsworth. (85) May 9; (14) May 9.
Preliminary Work on the Cleveland, Ohio, Water Purifying Problem.* M. P. Rice.
(80) May 6.
Notes on Fire Protection Requirements of the Water Mains in a Town of 4,000
Population. H. R. Lake. (Paper read before the Ins. Assoc. of the South.)
(86) May 6.
Construction and Cost of the Water Tunnel for the Talbingo Hydro-Electric
Development in Georgia.* Chas. C. Adam. (56) May 6.
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George H. Bliss. (Paper read before the Idaho Sec. of Engrs.) (84) May 6.
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Making Concrete Blocks for Reading Dam.* Wilson Fitch Smith. (13) May 7.
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Erosion.* (19) May 8.
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Water Purification Plant at Coshocton. Two Settling Basins and the Non-Rusted
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Type Provide Muskiday in Operation.* (14) May 9.
Water Rights on Element of Value in Fixing Rates. C. S. Sargeant Court Reverses
Lower Court and Sustains Contention of San Joaquin & Kings River Canal
& Irrigation Company, Inc. (14) May 9.
Air Displacement Hypochlorite Dosing Apparatus.* Henry W. Taylor. (14)
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Rapid Sand Filtration Plant at Tremton.* (14) May 9.
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Pattinson's New Mechanical Filters.* James W. Armstrong. (14) May 9.
Copper Sulphate Treatment at Philadelphia Waterworks. Is Result in Reducing
Micro-organisms in Filtered Water Shown in Open Reservoir.* Pumps in
Work. (14) May 9.
Coal of Obtaining Water from Wells at Owensboro, Ky. (85) May 12.
Construction Plant and Methods Employed in Reconcreting the Lining of the Elan
Park Reservoir of the Cincinnati Water Works.* Conrad C. Crain. (80)
May 13.
Expert Preliminary Report on Future Water Supply and Sewage Disposal Policy of
Chicago. (85) May 13.
Driving the Water Intake Tunnel at St. Louis.* E. C. Davis. (13) May 14.
Greater New York's Water Supply Scheme.* William T. Taylor. (Paper read
before the Inst. of Mun. Engrs.) (104) May 15.

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Water Supply—(Continued).

Siphonic Spillway for a Hydroelectric Plant; Design and Tests of Wasteway of Large Flume Connected with Tennessee Power Company's Second Ocoee River Development.* William P. Creager. (14) May 16.

Present Status of Wisconsin Water Powers. Daniel W. Mead. (Abstract of paper read before the Eng. Soc. of Milwaukee.) (14) May 16.

Electric Pumping and Irrigation.* E. V. Berg. (111) May 16.

Some Engineering Problems Connected with the Maintenance of a Water Supply Conduit.* R. G. Hosea. (86) May 20.

Results of Experiments Made to Determine Rate, Manner and Factors Influencing Death of Bacteria in Drinking Water and Polluted Streams. Otto Rahn and M. E. Hinds. (Paper read before the Illinois Water Supply Assoc.) (86) May 20.

Structural Features and Construction Methods, Hydro-Electric Plant at Elkhart, Ind.* William G. Fargo, M. Am. Soc. C. E., and Lucius B. Andrus. (86) May 20.

Masonry Construction Work at the Kensico Dam in 1913.* Wilson Fitch Smith. (13) May 21.

The Significance of *B. coli* in Water Examination. Joseph Race. (96) May 21.

High-Head Single-Stage Centrifugal Pump Driven by Steam Turbine; Youngstown, Ohio.* (13) May 21.

San Fernando Inverted Siphon, Los Angeles Water-Supply.* Burt A. Heinly. (13) May 21.

Seepage in Relation to Irrigation Project Drainage; Proposal to Pump Silt, Loosened by Giants, into Canal in Order to Form Lining and Reduce Losses. (14) May 23.

Vents on Steel Pipe Lines.* M. L. Enger and F. B. Seely. (14) May 23.

Ridge Block Construction in Filters at Evanston, Details of Construction and Cost of Monolithic Molded-in-Place Strainer System.* Chester Gordon Gillespie. (14) May 23.

Proposed Works for the Additional Water Supply of Toronto, Ontario.* (From Report to the City Council.) (86) May 27.

Commercial Development of the Minidoka Project Power Plant, U. S. Reclamation Service.* (86) May 27.

Hebron Earth Dam Washed Out, Failure of Reservoir Embankment in New Mexico Caused by Seepage of Water through Holes Made by Gophers or other Rodents.* C. B. Case. (14) May 30.

Wölfelsgrund Dam.* (14) May 30.

San Diego Water-Rate Case. (14) May 30.

Control of Check Valves on Emergency Fire Systems Connected with Regular Water Supply Pipes.* J. Walter Ackerman. (60) June.

Water Works of Bridgeton, N. J.* (60) June.

Sterilization of Water by Ultra-Violet Rays of the Mercury-Vapor Quartz Lamp.* M. von Recklinghausen. (42) June.

Specifications for Driving 12-in. Wells in Water-Bearing Sands at San Diego, Cal. (86) June 3.

Some General Plans and Preliminary Engineering Studies for the Development of the Hetch Hetchy Water Supply for San Francisco.* (86) June 3.

Providing a Shop Drinking Water System. Sterling H. Bunnell. (20) June 4.

Cascade River Power Development.* C. H. Mitchell. (Abstract of Report to the Dept. of the Interior.) (96) June 4.

Unwatering Equipment for Pressure Tunnels of the Catskill Aqueduct.* Horace Carpenter. (13) June 4.

Preliminary Investigations, Construction Sluicing and Core Sampling at the Somerset Dam.* J. Albert Holmes. (13) June 4.

Some Movable Dam Crests. W. L. Marshall. (13) June 4.

Wash Boring for the Winnipeg-Shoal Lake Aqueduct.* Douglas L. McLean. (96) June 4.

The Assouan Dam.* R. Holt. (Paper read before the Assoc. of Engrs. and Architects, Cairo.) (12) June 5.

Drainage of Shoshone Irrigation Project.* D. W. Murphy. (14) June 6.

Water Purification at Cleveland; Two Plants with Combined Capacity of 225 000 000 Gallons Daily.* (14) June 6.

A 19 000-ft. Water Tunnel Undertaking, Wilson Ave. Tunnel, Chicago.* (86) June 10.

Water-Power Development of the Southern Aluminium Co., near Whitney, N. C.* (13) June 11.

Air-Valves on Water Supply Mains. Clemens Herschel. (13) June 11.

Current Meters for Measuring the Flow in Large Pipes.* K. A. Heron. (13) June 11.

Progress on the Arrowrock Dam.* Charles H. Paul. (13) June 11.

A Machine for Winding Continuous Wood-Stave Pipe.* (13) June 11.

Notes on Centrifugal Pumps.* James T. Rossiter. (12) Serial beginning June 12.

Water-Softening Plant at Hooton, Cheshire.* (12) June 12.

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Wellsborough Dam.* (14) May 30.

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Water Power Plant Economics.* O. B. Coldwell. (Paper read before the National Elec. Light Assoc.) (111) June 13.
Condition of Steel Pipe after Seventeen Years Service, Results of Examination of 48-Inch Main at New Bedford.* R. C. P. Coggeshall. (14) June 13; (13) June 4.
The Evolution of the Water Tower of the Maryville, Mo., Water Works.* Clifford E. Phillips. (86) June 17.
Records of Heavy Rainfall and Runoff in Porto Rico. L. V. Branch. (13) June 18.
Removal of Oil and Gas from Drinking Water. C. D. O'Callahan. (Abstract of paper read before the Ill. Water Supply Assoc.) (13) June 18.
New Water Intake at Milwaukee.* (13) June 18.
Subaqueous Connections Between Tunnels and Pump Wells in Chicago.* (14) June 20.
Valuation of Minneapolis Water-Works for Rate-Making. (14) June 20.
The Multiple Arch Dam of Reinforced Concrete.* C. E. Grunsky. (111) June 20.
Canada's Largest Tank; Water Tower at St. Thomas is 131 Feet High and Holds 600 000 Gallons.* (14) June 20.
Increasing the Height of Concrete Dam Curved on 72-Foot Radius; Structure 90 Feet High to Have No Reinforcing, Depending Wholly on Arch Action.* (14) June 20.
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Movable Crests for Dams.* (14) June 20.
Loss of Water in Irrigation Systems. P. M. Fogg. (Paper read before the Conference of Operating Engrs. at Boise, Idaho.) (86) June 24.
Use of Compressed Air for Mixing and Placing the Concrete Lining for the 8 ft. Rock Tunnel Intake of the St. Louis Water Works.* (86) June 24.
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Southwestern Practice in the Purchase and Testing of Pump for Water Works Service. Charles Schultz. (Paper read before the Southwestern Water Works Assoc.) (86) June 24.
A Large Drifting-Sand Water-Filtration Plant for Toronto, Ont. (13) June 25.
A Large Elevated Water Tank at St. Thomas, Ont.* (13) June 25.
A Proportional-Flow Weir.* E. W. Rettger. (13) June 25.
A Flood in Boulder Creek, Colorado, with Damage to Water-Works.* H. E. Phelps. (13) June 25.
Characters of Mechanically-Filtered Water. Sheridan Delepine. (Paper read before the Inst. of Water Engrs.) (104) June 26.
Break in Hatchtown Dam, Earth Embankment in Utah is Washed Out After Seepage had been Detected at Downstream Face near Outlet Culvert.* Joseph Jensen. (14) June 27.
Constructing Hollow Reinforced Concrete Dam in Porto Rico.* L. V. Branch. (14) June 27.
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Repair of Los Angeles Aqueduct Siphon.* Burt A. Heinly. (46) June 27.
Water Coagulation and Its Effect on Character of Mechanical Filter Effluents. (Report of the Filtration Comm. of Wheeling, W. Va.) (86) July 1.
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The Wheeler Filter Bottom.* Robert Spurr Weston. (13) July 2.
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Water-Works Plans of the Public-Utilities Commission of Denver. A. Lincoln Fellows. (13) July 2.
Two Recent Water-Power Plant Accidents.* (13) July 2.
Continuous Aeration and Filtration of the Water of Public Swimming Baths.* L. Holme Lewis. (Paper read before the Inst. of Water Engrs.) (104) July 3.
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Making Three 24-In. Connection Cuts in a 60-In. Steel Water Main under Pressure, Pittsburgh, Penn.* Chas. A. Finley. (13) July 9.
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The Hydro-Electric Station at Tallulah Falls, U. S. A.* (73) Serial beginning July 10.

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Salmon River Hydroelectric Development.* (13) June 13.

Water Power Plant Economics.* O. H. Cole. M. (Paper read before the National Elec. Light Assoc.) (111) June 15.

Cracking of Steel Pipe after Standing Many Years. Results of Examination of 16-Inch Main at New Bedford.* E. C. T. (Telegraph.) (14) June 15. (13) June 17.

The Erection of the Water Tower of the Merrville, Mo., Water Works.* Clinton Republic. (60) June 15.

Removal of Heavy Material and Impurity in Pure Water. L. V. Urbahn. (12) June 15.

Removal of Oil and Gas from Drilling Water. C. O. (Bulletin. (Abstract of paper read before the Ill. Water Supply Assoc.) (14) June 15.

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Subpressure Connection Between Tunnels and Pump Wells in Chicago.* (14) June 20.

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Canada's Largest Tank; Water Tower at St. Thomas is 133 Feet High and Holds 300,000 Gallons.* (14) June 20.

Increasing the Height of Concrete Dam Formed of 72-Foot Hollow Structure 30 Feet High to Store 30 Billion Cubic Feet of Water.* (14) June 20.

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Monthly Cycle for Tanks.* (14) June 20.

Loss of Water in Irrigation Systems. F. M. Fox. (Paper read before the Colo. Section of Operating Engrs. at Ohio Fields.) Mch. June 22.

Use of Compressed Air for Mixing and Placing the Concrete Lining for the 8 ft. Tunnel Found Inside of the 9-ft. Iron Water Pipe.* (60) June 22.

Design Features of the New Rapid Sand Filtration Plant at Waco, Texas. (60) June 22.

Boulevarded Parking in the Disposal and Testing of Storm Do. Water Works Service. Charles Sidney. (Paper read before the Southwestern Water Works Assoc.) (60) June 22.

A Large Purifying-Sand Water-Filtration Plant for Toronto (Ont.). (11) June 22.

A Large Elevated Water Tank at St. Thomas (Ont.).* (13) June 20.

A Proportional-Flow Weir. F. W. Brown. (13) June 20.

A Proof in Double Cross, Coloring, with Ferrocyanide in Water-Works.* H. E. Phelps. (13) June 20.

Characters of Mechanically-Filtered Water. Sheridan Dodgins. (Paper read before the Inst. of Water Engrs.) (104) June 20.

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Concentric Hollow Diamond Concrete Dam in Pyrmont.* (11) June 27.

Raising the St. Louis Waterworks Tunnel with Compressed Concrete to Prevent Leakage.* (14) June 27.

Tunnel Behind Wooded Point.* (14) June 27.

Report of Los Angeles Aqueduct Engineer. Fred A. Brandt. (40) June 27.

Water Conditions and Its Effect on Character of Development After Reservoir. (Report of the Filtration Comm. of Worcester, Mass., for 1910.) July 1.

Reducing the Per Capita Consumption of Water. Metropolitan District. Boston. (13) July 1.

The Wheeler Filter Patent.* Robert Spurr Weston. (14) July 1.

The Kelvin Hydro-Electric Plant, Pumping Canal.* (13) July 1. (14) July 1.

Water-Works Plans of the Public-Utilities Commission of Denver. A. Lincoln Tobey. (13) July 1.

Two Recent Water-Power Plant Accidents.* (13) July 1.

Destructive Aeration and Pulsation of the Water in Public Delivery Mains.* E. Bolton Lewis. (Paper read before the Inst. of Water Engrs.) (104) July 5.

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Analysis of Arch Dam Stresses.* Dale S. Stroul. (11) July 1.

Improving the Water Supply of Galveston, Texas. (13) July 1.

A Proposed Defer-istion and Conservation Plan for the Lowell, Mass., Water Supply. (13) July 8.

Reservoir Embankment Failure: Turlock Irrigation District, California.* (13) July 8. (14) July 13.

Making Three 24-in. Connection Outs in a 60-in. Steel Water Main under Pressure at Pittsburg, Penn.* Chas. A. Finley. (13) July 8.

The Trestle Dam, Eaton, N. H., an Earth Embankment for Boston Flood Waters.* (13) July 8.

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The Development and Theory of the Pitot Tube.* A. H. Gibson. (12) Serial beginning July 10.
Operation of Minidoka Reclamation Project.* Barry Dibble. (111) July 11.
Completion of San Fernando Siphon, Los Angeles.* William W. Hurlbut. (14) July 11.
Dam Building at 7 Cents a Yard, Constructing the San Fernando Earth Dam of Los Angeles Aqueduct by Hydraulic-Fill Method.* (14) July 11.
Underdrain Experiences at Kansas City, Kansas, Breaking of Strainer Anchor Bolts Causes Uplift of Gravel and Rupture of Screen.* Wynkoop Kiersted. (14) July 11.
Large Balanced Valves for Reservoir Outlets, Regulating Discharge through Arrowrock Dam on Boise Project in Idaho by Twenty 52-Inch Horizontal Submerged Conduits.* (14) July 11.
Cost of Cleaning and Repairing Weston Aqueduct.* (14) July 11.
A Low-Head Water-Power Plant. (The Coon Rapids Plant on the Mississippi River.)* (13) July 16.
Failure of Mixing Flumes for Water-Softening and Filtration Plant, Dallas, Tex.* N. Werenskiold. (13) July 16.
Repairing Leaks in an 8-Inch Main 40 Feet under Water. (96) July 16.
Saskatchewan Regulations Governing Water and Sewerage Works. (96) July 16.
The Largest Elevated Steel Tank.* R. W. Becker. (13) July 16.
A Large National Water-Works System for Cities and Towns in Southern Italy.* John C. Trautwine, Jr. (13) July 16.
Water Supply for Cities and Towns. Bernard E. T. Ellis. (96) July 16.
A Deep Well Water Supply Installation.* (15) July 17.
The Eastwood Multiple-Arched Dam.* John S. Eastwood. (111) July 18.
Hydroelectric Cost Data (Seattle, Wash.) J. D. Ross. (111) July 18.
Removal of Carbonic Acid, Iron and Manganese from Lowell Well-Water Supply. Frank A. Barbour. (14) July 18.
Salmon River Surge Tank; Design and Construction of the Tallest Standpipe Yet Built, Employing the Differential Principle to Minimize Surge.* (14) July 18.
Rapid Installation of a Temporary Booster Pump in San Diego. (14) July 18.
Cedar Rapids Hydroelectric Development; Work on a 160 000-Horsepower Low-Head Plant Containing the Largest Sized Units in the World and Having a Headrace Two Miles Long.* (14) July 18.
Water Consumption in Metropolitan District, Boston. (14) July 18.
Spacing of Piers for Reinforced-Concrete Pipe.* Richard Mulier. (14) July 18.
Genuine Wrought-Iron Pipe, Description of the Process of Manufacture from Pig Iron to Finished Product. Charles Gross. (20) July 23.
Etablissement de Nouvelles Pompes Electriques pour le Service des Eaux de Bordeaux.* Lidy. (43) Mar.
Installation Hydro-Electrique en Kabylie.* L. Neu. (32) May.
Une nouvelle Machine pour la Fabrication des Tuyaux en Ciment. (84) May.
Installation d'une Pompe Centrifuge à Commande Electrique, dans le Lac Léman, pour Alimentation de Genève.* A. Bétant. (33) May 30.
Théorie du Coup de Bélier.* Lorenzo Allievi. (37) Serial beginning May 31.
Les Eaux Souterraines, Captage et Purification. Auguste Moreau. (92) June.
Filtre à Sable à Bac de Lavage Indépendant.* L. Raimbert. (92) June.
Les Turbines à Frottements ou Turbines Tesla. E. Mérigault. (37) June 30.
Die Hauswasserversorgungsanlagen mit elektrischem Antrieb.* J. Schmidt. (48) Serial beginning Apr. 11.
Hohe Speisewasservorwärmung auf Dampfern.* Ofterdinger. (48) Apr. 18.
Eisenbetonrohre mit Klinkerauskleidung.* Krafft. (39) Apr. 20.
Das preussische Wassergesetz. Kisker. (40) May 6.
Abdichtung von Segmentwehren (-schutzen), die nach Unterstrom gekehrt und gegen Ueberdruck zu öffnen sind.* Helmershausen. (40) May 6.
Die neue Kraftübertragungs-Anlage der Shawinigan Water & Power Co. in Montreal, Kanada.* Friedrich T. Kälin. (107) Serial beginning May 9.
Ueber fortlaufende Reinigung der Bassinwässer in Badeanstalten.* J. Kister. (7) May 16.
Einfluss des Innenanstrichs von Zementrohren mit Inertol auf die Grösse des Leitungswiderstandes, den Wasser beim Fliessen in Zementrohren findet.* R. Stückle. (48) May 16.
Berechnung zylindrischer Wasserbehälter mit Berücksichtigung der Sohleneinspannung.* Joachim Schultze. (78) May 25.
Zur Frage der Ausnutzung norwegischer Wasserkräfte.* Norberg-Schulz. (41) June 4.
Neuere Grundlagen für die statische Berechnung von Talsperren. Paul Fillunger. (53) June. 5.
Das Wasserwerk in Militsch i. Schles.* J. Svagr. (78) Serial beginning June 12.
Die neuen Wasserrechtsgesetze. Ernst Seidler. (53) June 19.
Grundlagen zur Berechnung von Wasserrohrleitungen.* B. Biegeleisen und R. Bukowski. (7) Serial beginning June 20.
Teorie del Colpo d'Ariete (Theorie des Wasserstosses.) Lorenzo Allievi. (107) June 20.

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Vom Bau der Wasserkraftanlage Faal a. d. Drau.* (107) June 20.
Rostbildung in Warmwasserbereitungsanlagen. (7) June 27.
Aussenunterwerke der Alabama Power Co.* W. E. Mitchell. (41) Serial beginning July 9.

Waterways.

How the Ancients Would Have Controlled the Mississippi and Its Tributaries. William Willcocks. (58) Mar.
The Flood of 1913 at Lima and Marietta, Ohio. Walter J. Sherman. (36) May.
Some Damage by the Lake Storm, November, 1913.* Mason M. Patrick, M. Am. Soc. C. E. (100) May.
Damage to Harbor Works in the Cleveland, Ohio, Engineer District Caused by the Storm of November, 1913.* R. B. Perry. (100) May.
Cylindrical Valves, and Automatic Crests of Dams.* W. L. Marshall. (100) May.
The Enlargement of Governors Island.* Henry Nash Babcock. (100) May.
Flood Prevention. J. C. Oakes, M. Am. Soc. C. E. (Paper read before the Indiana San. and Water Supply Assoc.) (100) May.
Outline of River Regulation and Control in Antiquity. Sir William Willcocks. (Paper read before the National Drainage Congress.) (86) May 6.
The Boundary Waters of Rainy River District. (From Report of the International Joint Comm.) (86) May 6.
Methods of Flood Prevention. John C. Oakes. (Abstract of paper read before the Engrs. and Archts. Club of Louisville, Ky.) (13) May 7.
Breaking a Heavy Ice Jam in the Great Miami River.* Paul D. Fuqua. (13) May 7.
The Port and City of Rangoon.* G. C. Buchanan. (29) May 8.
The Berlin-Stettin Canal.* (11) May 8.
Bending Rails and Rods for Reinforcement Work at Panama.* (62) May 11.
An Investigation of the Use and Rating of the Current Meter.* Chas. P. Rumpf. (13) May 14.
Drill Boat for Submarine Blasting at Vancouver, B. C.* (13) May 14.
Handling Canal Bank Slides in Chicago. (Abstract of report to Sanitary District of Chicago.) (14) May 16; (13) May 28.
Volume and Cost of Construction Work on the Panama Canal to Jan. 1, 1914. (86) May 20.
American Port and Harbor Work. (13) May 21.
The Channel Tunnel and Its Early History.* John Clarke Hawkshaw. (29) May 22.
Boat for Sloping Canal Banks, Novel Outfit Specially Devised to Follow Suction Dredges and Shape the Slopes on the New York State Barge Canal Work at Rome.* (14) May 23.
General Design of Drainage Pumping Plant, South Quincy Drainage and Levee District, Illinois.* (86) May 27.
Beach Erosion and Shore Protection, Atlantic City, N. J.* Mandes Golder. (13) May 28.
Comparative Designs of River Steamship Piers, Philadelphia, Penn.* (13) May 28.
Operation of the U. S. Suction Dredge *New Orleans*.* (13) May 28.
An Exceptionally Heavy and Complex Piledriver.* (13) May 28.
The River Training Wall at Rangoon.* (12) May 29.
Winter Operation of Movable Dams.* (14) May 30.
Effect of Creosote on Timber in Galveston Bay.* (14) May 30.
New Type of Driver for Large Concrete Piles, Equipment Specially Designed for Use in Building the Reinforced-Concrete Pier of the Intercolonial Railway at Halifax.* (14) May 30.
A Dry-Land Mattress on the Mississippi.* F. Y. Parker. (13) June 4.
Lock Entrance Caissons for the Panama Canal.* (11) June 5.
Comparative Costs of Different Designs for Piers, Digest of Alternative Bids on Six Types Obtained by Department of Wharves, Docks and Ferries, Philadelphia.* (14) June 6; (13) May 28.
The Construction of Hydraulic-Fill Levees.* D. L. Yarnell. (13) June 11.
Large Reinforced-Concrete Pier at Halifax; Use of 24-Inch Piles 75 Feet Long, Made of Special Cement to Resist Chemical Action; Brace Piles Cambered to Neutralize Stresses.* (14) June 13.
Effect of Storms on Breakwaters. (14) June 13.
Protection Against Inundation in Holland.* William Hoeker. (13) June 18.
The New Joint Dock at Hull.* (22) June 26; (57) June 26; (26) July 3; (23) June 26; (12) June 19; (11) June 26; (73) June 26.
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Unloading Iron Ores on the Lower Lakes.* Geo. E. Edwards. (82) June 20.
The $7 000 000 Merrimac River Waterway Project.* (86) June 24.
Manufacture of Concrete Block for River Protection Mattresses.* B. Okazaki. (13) June 25.
Hydrographic-Survey Methods, Cape Cod Canal Channel Excavation.* E. F. Verplanck. (13) June 25.

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Vom Bau der Wasserkraftanlage Faal a. d. Drau.* (107) June 20.
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Manufacture of Concrete Block for River Protection Mattresses.* B. Okasaki. (13) June 25.
Hydrographic-Survey Methods, Cape Cod Canal Channel Excavation.* E. F. Verplanck. (13) June 25.

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Pile and Concrete Seawall for Land Reclamation at New Orleans.* (13) June 25.
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Reinforced Concrete Piles to be Ninety-One Feet Long. (14) June 27.
San Francisco and Machina Piers, Havana.* (14) June 27; (13) June 25.
Largest Ore-Shipping Dock in World (at Duluth).* (62) June 29.
Reversed Parker Bear-Traps, Dam No. 13, Ohio River.* F. W. Altstaetter, M. Am. Soc. C. E. (100) July.
Damage to Lining of Filling Tunnel, Poe Lock, St. Mary's Falls Canal.* Mason M. Patrick, M. Am. Soc. C. E. (100) July.
Repairing Leaks in an 8 inch Water Main 40 feet Under Water in Galveston Harbor, Texas.* N. T. Blackburn. (100) July.
Large Revolving Steam Shovel for Canal Construction.* Jean M. Allen. (86) July 1.
Failure of Coffer-Dam at Dam No. 1, Mississippi River, St. Paul. (13) July 2.
Vertical-Framed Lock-Gates, St. Paul-Minneapolis Dam.* (13) July 2.
A Private River-Straightening Enterprise at Cleveland.* (13) July 2.
Storm Damage to Steel Structures at Duluth (Docks).* (13) July 2.
Panama Canal Hydroelectric Development.* (111) June 27; (19) July 11; (22) July 3; (14) July 4; (27) July 4.
Break in Volcano Lake Levee; Colorado River Flood Situation at Imperial Valley.* (14) July 4.
Spillway Gates on Fixed Wheels.* (14) July 4.
Lock Entrance Caisson, Panama Canal. (From the *Canal Record.*) (96) July 9.
Pumping Machinery for the Royal Albert Docks.* (12) July 10.
The Alexandra Dock Extension at Newport.* (11) Serial beginning July 10.
Surface Condenser for Steam Rock Drills, Equipment of Drill Scow for Submarine Work Where Fresh Water for Boilers was not Plentiful. Frank Richards. (14) July 11.
Cost of Driving Piles with a Gasoline Hoist.* (14) July 18.
Deep Cofferdam for 1 050-Foot Pier in New York, Unbraced Steel Sheet-Pile and Riprap Construction of Pocket Type to Resist Maximum Pressure Head of 68 Feet.* (14) July 18.
Mississippi River Protection Mat Construction.* (14) July 18.
Creosoted Piles on Pacific Coast. N. A. Bowers. (14) July 18.
Bronx Terminal, New York City, Bulkhead Work on a Project for Waterfront Development.* J. R. Marsh. (14) July 27.
Note sur Quelques Ports Maritimes de la Côte Atlantique et sur la Navigation des Grands Lacs de l'Amérique du Nord.* G. de Joly. (43) Mar.
Le Barge Canal de l'Etat de New-York.* Leclerc de Pulligny. (43) Mar.
L'Ourthe Supérieure.* J. Duvigneaud. (30) Serial beginning June.
La Consolidation des Berges des Canaux et Rivières, Perrés en Dalles de Béton et en Bétons Maigres Damés sur Place, Expérimentés au Canal de Charleroi à Bruxelles.* Ch. Béranger. (35) June.
Les Travaux de Correction de la Loire Maritime.* Charles Aubert. (33) June 27.
Grands Docks Flottants de l'Amirauté Brittannique de la Medway et de Portsmouth.* (33) July 4.
Elektrisches Kraftwerk des Kaiser-Wilhelm-Kanals auf der Kaiserlichen Werft am Saatsee.* v. Lösecke. (49) Pt. 4.
Erweiterung des Emder Hafens.* Zander. (49) Pt. 4.
Der Bau von Schleppzugschleusen an der oberen Oder von Cosel bis Neissemündung.* Schulte und Hillebrand. (49) Pt. 4.
Entleerungsanlage im Grossschifffahrtweg Berlin-Stettin. H. Niebuhr. (40) Apr. 22.
Eine neue Geschwindigkeitsformel für natürliche Flussgerinne.* Otto Gröger. (53) May 1.
Der Grossschifffahrtweg Berlin-Stettin.* (80) May 2.
Der Einfluss der Zugrichtung des Wetters auf die Abflussverzögerung in Kanälen. Sprengel. (39) May 5.
Schiffbarmachung von Flüssen durch Stantore.* Ign. Pollak. (53) May 8.
Oertliche und zeitliche Beziehungen zwischen Niederschlag, Abfluss und Verdungstung der Flussgebiete.* H. Keller. (40) May 16.
Betonmolen, Seemolen bei Vorupör und Hanstholm an der Westküste Jütlands.* C. Bech. (80) May 16.
Bremens Entwicklung auf dem Gebiete des Hafen- und Strombaues seit 1880.* H. Bücking. (48) June 6.
Neuere Eisenbetonbauten in Hauptseehäfen und Mittel zu ihrer Sicherung.* Goldberg. (78) June 12.
Wirtschaftliche Betrachtungen über die Rheinschifffahrt bis zum Bodensee.* Sympher. (40) June 17.
Die neuen Wasserrechtsgesetze. Ernst Seidler. (53) June 19.
Die Erweiterung des Kaiser-Wilhelm-Kanals.* W. Groth. (40) June 24.
Die Hochwasserkatastrophe in Graz am 16. Juli 1913.* Armin Schoklitsch. (53) July 3.

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